THE UNIVERSITY
of EDINBURGH

Undergraduate Nursing Students' Learning Dynamics and Their Use of Information and Communications Technology in Clinical Environments in South Korea

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Thesis presented in fulfilment of the requirement of the degree of Doctor of Philosophy

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DECLARATION

I hereby declare that the thesis has been composed by myself and that the work has not be submitted for any other degree or professional qualification. I confirm that the work submitted is my own, except for included work that has formed part of jointly-authored publications. My contribution and those of the other authors to this work have been explicitly indicated below. I confirm that appropriate credit has been given within this thesis where reference has been made to the work of others.

Part of the quantitative strategy undertaken for this research was previously published in the Journal of Advanced Nursing, titled ‘Nursing students' attitudes towards information and communication technology: An exploratory and confirmatory factor analytic approach’ by Jung Jae Lee (myself) and Charlotte Clarke (my principal supervisor). This study was conceived by the co-author (Charlotte Clarke). I carried out the design, data collection, and analysis of the research and wrote this article for publication as the first author.

Jung Jae Lee

ABSTRACT

- **Background**

Clinical placements are essential to nursing education, allowing students to gain live experience and knowledge of nursing in clinical environments prior to entering the healthcare workforce. Healthcare has increasingly integrated information and communication technology (ICT) into clinical environments, therefore ICT is also significant in nursing students' clinical placements. However, research has revealed that despite its benefits, nurses and nursing students are unable to use ICT effectively for their practice and their learning. This may reflect one aspect of the challenges faced by nursing students as they learn during clinical placements. Therefore this research aims to analyse the dynamics of undergraduate nursing students' learning and use of ICT during clinical placements. By doing so, this research seeks to develop theoretical models that can be used to improve clinical nursing education amidst the current technology era.

- **Research design**

This study was conducted in Seoul, South Korea. A qualitative-dominant mixed method strategy was adopted. Quantitative data was collected through the development of a modified Information Technology Attitude Scales for Health (ITASH), which was then administered to 508 nursing students from six different universities from October 2012 to December 2012. Constructivist grounded theory

(CGT) guided qualitative data collection, which was achieved through sequence of four rounds of intensive individual and group interviews with 16 nursing students, 4 qualified nurses, and 2 university lecturers from April 2013 to June 2015 (a total of 23 individual interviews and 6 group interviews). The exploratory and confirmatory factor analyses of quantitative data analysis were supported by SPSS and LISREL, while the constant comparison approach of qualitative data was supported by Nvivo 10.

- **Findings**

The findings revealed: 1) nursing students' learning dynamics through the qualitative research process based on CGT methodology, and 2) nursing students' use of ICT during clinical placements based on the learning dynamics via both qualitative and quantitative research processes. In the learning dynamics, this study identified the nursing students' cognitive learning and knowledge building process, and then the factors and dynamics influencing that process in the clinical environment. This was compared with classroom and simulation environments. Based on these dynamics, the factors and dynamics influencing the use of ICT for learning in the clinical environment was identified. An integration of the findings with supporting literature resulted in two theoretical models, the knowledge building dynamic (KBD) model and the contextual knowledge building dynamic (CKBD) model. These models assist in understanding the cognitive processes involved in an individual's learning process, the influence of context and resulting dynamics on these processes, and subsequently, learning with ICT.

- **Conclusion**

This research expands on current nursing education literature by exploring the cognitive aspects of learning, specifically within the clinical environment. These are shaped by contextual factors such as socio-cultural factors, and their influence on students' learning and use of clinical ICT. The theoretical models are relevant for several applications in educational assessment and design, policy, and in learning itself with the goal of improving the quality of patient care.

LAY SUMMARY

Clinical placements form a core part of nursing education, during which nursing students develop many of the skills they will require as qualified nurses. These clinical placements take place in real clinical environments, such as hospitals, where nursing students learn alongside qualified nurses. As nurses currently use technology in their daily duties of caring for patients and recording medical information, nursing students also have to handle the same complex technology for their learning during clinical placements. However, nursing students have been reported to be struggling with learning during clinical placements.

Hence, the aim of this research was to understand how nursing students learn in clinical environments where technology is heavily used, and how nursing students use technology for their learning. The research was conducted in Seoul, South Korea, as technology is used very heavily in everyday life there. Data was collected using surveys with 508 nursing students from October 2012 to December 2012 as well as one-on-one and group interviews with 16 nursing students, 2 university lecturers, and 4 qualified nurses from April 2013 to June 2015.

The results revealed clearly that knowing how nursing students handle different aspects of their environment was vital to understand their use of technology in learning. Models were created as guides for understanding and application to other educational areas.

With this understanding, improvements to the undergraduate clinical nursing

education can be made at government, university, and hospital levels. With these improvements, nursing students will be better prepared to work as qualified nurses and use technology in the clinical environment, therefore improving patient care.

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LIST OF JOURNAL PUBLICATION

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GLOSSARY

AGFI	Adjusted Goodness of Fit Index
AVE	Average Variance Extracted
BLT	Behavioural Learning Theory
BSc	Bachelor of Science degrees
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CGT	Constructivist Grounded Theory
CKBD Model	Contextual Knowledge Building Dynamic Model
CogLT	Cognitive Learning Theory
ConLT	Constructivist Learning Theory
CR	Construct Reliability
df	degrees of freedom
EBP	Evidence-Based Practice
EFA	Exploratory Factor Analysis
EHR	Electronic Health Records
EMR	Electronic Medical Records
ESRC	Economic and Social Research Council
GFI	Goodness-of-Fit Index
GT	Grounded Theory
IELTS	International English Language Testing System
ICT	Information and Communications Technology
ID	Identification
IFI	Incremental Fit Index
IMIA-NI	International Medical Informatics Association - Nursing Informatics
ITASH	Information Technology Attitude Scales for Health
KABNE	Korean Accreditation Board of Nursing Education
KBD Model	Knowledge Building Dynamic Model
KMO	Kaiser-Meyer-Olkin
LISREL	Linear Structural Relations
MAP	Minimum Average Partial
MBChB	Bachelor of Medicine and Bachelor of Surgery degree
MNRES	Minimum Residuals
MSc	Master of Science degree

NATC	Nurses' Attitudes Toward Computerisation
NCATT	Nurses Computer Attitudes Inventory
NFI	Normal Fit Index
NHS	National Health Service
OECD	Organisation for Economic Co-operation and Development
OCS	Order Communication Systems
PA	Parallel Analysis
PACS	Picture Archiving and Communication Systems
PC	Personal Computer
PCA	Principal Component Analysis
PDA	Personal Digital Assistant
PhD	Doctor of Philosophy degree
PISA	Programme for International Student Assessment
RMR	Root Mean square Residual
RMSEA	Root Mean Square Error of Approximation
SBL	Simulation-based Learning
SD	Standard Deviation
SNS	Social Networking Service
SPSS	Statistical Package for the Social Sciences
TOEIC	Test of English for International Communication
TOEFL	Test of English as a Foreign Language
UK	United Kingdom
USA	United States of America
V/S	Vital Signs
WHO	World Health Organisation

CHAPTER ONE: INTRODUCTION

1.1. Introduction

One of the representative terms of the present era is 'technology'. Technology, particularly Information and Communications Technology (ICT), has greatly influenced society by changing people's daily lives due to its tremendous advantages. People are able to interact and exchange information with increased frequency and ease, allowing for constant innovation and creation, as well as improving workplace efficiency across all fields. The healthcare field, for example, has developed greatly since the introduction of ICT. ICT enables healthcare professionals to manage information overflow, increases their work efficiency, and improves patient safety (Bates & Gawande, 2003; McGonigle & Mastrian, 2009; Parente & McCullough, 2009). Similarly, the development of ICT has also transformed the infrastructures and paradigms of education by providing opportunities to improve instructional methods and therefore enhance learning.

The nursing field has attempted to utilise ICT in its practice and education (McGonigle & Mastrian, 2009). Nursing is a profession that constantly requires the construction and utilisation of knowledge (McBride, 2010), and ICT can be used to assist the process, so as to ensure provision of safe and professional nursing care. However, it has often been found that nursing professionals and students are insufficiently trained to use ICT competently, and consequently have fallen out of step with the rapid development of ICT, ironically despite being inclined to it for personal use (Lee, 2007; Scott *et al.*, 2008; Elder & Koehn, 2009; Foster & Bryce, 2009; Hwang & Park, 2011).

Nursing students should be equipped with sufficient skills and knowledge before beginning practice as a nurse, but the lack of ICT competencies can hinder their knowledge building. Therefore nursing students need to build up competencies in using ICT during their nursing education so as to maximise their learning potential.

Nursing education seeks to provide nursing students with both theoretical knowledge and practical skills, thereby assisting, guiding, and supporting them in their professional development to become fully qualified nurses (Moscaritolo, 2009). In particular, clinical placements are an essential part of nursing education, because students can learn, develop and perfect many of the practical nursing skills only through clinical placements (Xu *et al.*, 2000; Levett-Jones *et al.*, 2007). Thus the significance of clinical placement education should not be underestimated when comparing against classroom learning and simulation-based learning (SBL). However, many nursing research studies such as Moscaritolo (2009) and Lapkin *et al.* (2010) have reported that nursing students are struggling to learn during clinical placements. As a result, their development of clinical nursing skills as well as building of nursing knowledge are accordingly obstructed. Moreover, newly qualified nurses with insufficient clinical competencies and nursing knowledge may experience a reality shock at their new workplaces and thus consider resigning from their post (Cowin & Hengstberger-Sims, 2006).

However, there is lack of research on nursing students' knowledge building dynamics, as well as their use of clinical ICT in clinical environments. Therefore, it would be necessary to examine and understand the dynamics of how nursing students learn and what factors influence their learning in clinical environment. In addition, it would be

useful to investigate nursing students' clinical ICT competencies and explore how they utilise clinical ICT for their knowledge building during clinical placements. This exploration will support an in-depth understanding of the learning dynamics in clinical environments.

1.2. Aim and objectives of this research

This research aims:

> To analyse the dynamics of undergraduate nursing students' learning and use of ICT during clinical placements.

To achieve the research aim, the objectives of this research are:

- To explore nursing students' cognitive processing of information to build knowledge;
- To identify the dynamics of nursing students building nursing knowledge in clinical contexts;
- To evaluate and understand nursing students' attitudes regarding the use of ICT in the clinical contexts and to demonstrate nursing students' use of ICT for their knowledge building in clinical contexts;
- To develop theoretical models demonstrating the learning dynamics in clinical environments, so that it can be used by various stakeholders involved in nursing and education.

1.3. Organisation of this thesis

This thesis is divided into seven chapters as below:

1) Chapter One is the general introduction of this study. In this chapter, the aim and objectives of this research are provided.

2) Chapter Two reviews the background of this research and offers the groundwork for this research. This chapter consists of three main topics: technology in nursing, learning and ICT in nursing, and healthcare delivery systems and undergraduate nursing education in South Korea (hereafter Korea).

3) Chapter Three details the design of this research. The rationale for the chosen qualitative-dominant mixed method research methodology and methods are explained. The research process details of data collection and analysis are also discussed, along with the ethical considerations and limitations of this research.

4) Chapters Four to Six present the findings of this research. Chapter Four discusses nursing students' definitions of information and knowledge, and then their cognitive process of knowledge building using information. Chapter Five examines the knowledge building dynamics in clinical environments within the context of nursing education. Six factors that influence nursing students' clinical education are identified, as well as the students' responses to the factors. Moreover, the dynamics within clinical environments are compared with that of classroom and simulation environments. A process model of nursing education in Korea is then introduced. Following these, nursing students' use of ICT based on the dynamics in the clinical environments is explored in Chapter Six.

5) Chapter Seven provides the discussions of the findings of each chapter with existing literature. Based on these, two theoretical models of nursing students' learning dynamics are finally introduced.

6) Chapter Eight demonstrates the summary of this research, the strengths and limitations of this research, recommendations for further research, as well as the implications of the research findings for policymakers, university lecturers, hospitals, nurses and nursing students.

CHAPTER TWO: BACKGROUND

2.1. Introduction

In this chapter, the literature review provides the relevant background of technology, particularly ICT, and learning in nursing. As many definitions and interpretations of the terms technology and ICT exist, this chapter firstly analyses the definitions and presents my interpretation. The use of ICT in healthcare and nursing fields will also be explored. Following this, learning with ICT will be critically discussed by exploring three learning theories (i.e., behavioural learning theories (BLT), cognitive learning theories (CogLT), and constructivist learning theories (ConLT) and their relationships with ICT. The healthcare systems and nursing education programme for undergraduate students in Korea will also be introduced as this research recruited Korean participants (i.e., nursing students, nurses and university lecturers in Korea).

- **Search Strategy**

In order to find relevant academic information and articles for my literature review, I used the following electronic databases: CINAHL Plus, 'DiscoverEd' (University of Edinburgh Library's electronic catalogue for all collections made available by the library, including journal articles, e-books, database content and other sources), EMBASE, Google Scholar, Medline, PubMed, Science Direct and Wiley. As three different topics are to be discussed in Chapter Two, different combinations of keywords were used to search the databases for relevant literature on each topic. Moreover, I extended the literature search to obtain more detailed information based

on the recognition of other key issues and trends from the initial search. For example, while exploring nursing informatics literature, ‘cognitive science’ was discovered to have an important role in nursing informatics, therefore literature related to ‘cognitive science’ was additionally investigated.

For the topic of technology in nursing, keywords: ‘Information and communications technology’, ‘Nursing’, ‘Nursing informatics’ and/or ‘Technology’ were adopted. Reports and definitions of terms from authorised organisations: the Organisation for Economic Co-operation and Development (OECD), World Health Organisation (WHO) and International Medical Informatics Association - Nursing Informatics (IMIA-NI) were utilised to describe demographics, statistical data and/or definitions. Keywords: ‘Constructivist learning theory’, ‘Information and communications technology’, ‘Learning theories’ and/or ‘Nursing education’ were used for the topic of learning in nursing. Due to the limited number of articles in English, Korean electronic databases (the National Assembly Library and the National Digital Science Library) and information from authorised organisations (Korean Accreditation Board of Nursing Education (KABNE), Korean Nurses Association and OECD) in the Korean language were also used to explore the topic of healthcare delivery systems and the undergraduate nursing education system in Korea. Combinations of keywords: ‘Care delivery system’, ‘Nursing education’, ‘Undergraduate’, ‘Clinical placements’, ‘Clinical practicum’, ‘South Korea’, ‘Simulation-based learning’ and/or ‘Technology’ were used.

Several articles dating from 1916 to present day (i.e., 2015) were collected. In order to manage the literature search, I established search criteria. I focused primarily on the

literature that included all the keywords of each topic, particularly in the area of nursing and nursing education. When relevant philosophies and theories were explored, the literature search widened in order to understand their corresponding trends and histories, spanning broad areas and periods. However, when contexts of technology in healthcare areas were described, I preferably searched for literature published after 2000 to ensure concurrency, due to the rapid development of technology. While literature published in peer-reviewed journals in the English language were prioritised for review, literature published in peer-reviewed journals in the Korean language were also reviewed, particularly when this research dealt with topics related to Korea.

There were some limitations when attempting to explore philosophical issues with electronic literature sources. Thus, further information was obtained from printed sources, such as books.

2.2. Technology in nursing

2.2.1. Time for technology

Technology has evolved continuously since the term was generated, and the pace of this evolution has been quickening since the Industrial Revolution. This trend has influenced and changed the world enormously, and consequently, people must understand, utilise, and study technology and its effects.

Even though there are many definitions of technology, technology has been mostly defined with a narrow interpretation. For example, people often refer to technology as

solely electronic gadgets operated by technicians. However, Fritsch (2011) stressed that technology should be understood by narrow as well as broad views. He believed the technical interpretation of technology (e.g. tool and machines) is narrow, while a broad view covers the narrow interpretation and additional cultural and organisational aspects. In the nursing field, Barnard (1996, p.435), a professional in the areas of nursing education, technology and philosophy, similarly provided a useful and broad interpretation of the term 'technology' as follows:

> "*It is important to recognise that technology has at least three layers of meaning. Firstly, technology at its most basic and obvious level refers to physical objects such as tools, machinery, and matter. These physical objects are manipulated to obtain particular ends. Secondly, technology is a form of knowledge in which, meaning is awarded to an object (e.g. a cardiac oscilloscope) through our knowledge of how to use, repair, design, and make it. Thirdly, technology forms part of a complex set of human activities*."

A few years later Barnard (Barnard, 2002, p.16) extended his observations of technology: "*Its meaning is subject to historical and socio-cultural bias and is associated increasingly with sophisticated machinery, industrial objects, computerised or electronic automata, scientific knowledge and technical skills*". In these definitions, technology is interpreted not only as simple, physical objects that produce outcomes, but as including the contexts and subjective responses of humans who deal with technology (Barnard, 2002; Fritsch, 2011). By embracing both its mechanical and human aspects, a deeper understanding of technology is achieved through these definitions. Jones (1996) also advocated their views on technology by emphasising

that technology should be defined as an integral aspect of humans' lives rather than only regarding it as a tool.

It is important to note that there are many types of technologies. Of them, it would be no exaggeration to say that ICT currently receives the most public attention. ICT is defined as "*technology used to acquire and process information in support of human purpose. It is typically instantiated as IT systems – complex organisations of hardware, software, procedures, data, and people, developed to address tasks faced by individuals and groups*" (March & Smith, 1995, p. 252). World Bank (2000) and Marcelle (2000) also provided similar definitions of ICT to March and Smith: ICT is a set of tools facilitating humans' activities to process, transmit, display, and share information using electronic means. In other words, ICT can be regarded as any technological system (e.g. telecommunication networks, the internet), hardware (e.g. computers, televisions, mobile devices) or software (e.g. electronic medical records (EMR)) that allows the acquisition, processing, and distribution of information to assist knowledge building. When searching for the definition of ICT in recent academic work, it was found that the term had been largely used without providing a clear definition. This could be because ICT has already become an integral part of our daily lives.

Today, it is evident that ICT is influential in people's daily lives; 82.6% of British households had access to a computer within their homes in 2010. Moreover, 32.6% and 44.4% of people in the United Kingdom (UK) were fixed and wireless broadband subscribers, respectively (OECD, 2011a). This evidence of heavy ICT usage is not solely localised within the UK. Many other countries throughout Europe, Australia,

North East Asia and North America showed similar patterns (OECD, 2011a). In particular, Korea has achieved a higher level of ICT use and has been recognised as a powerful country in the ICT industry. For example, in the index of households with access to the internet, Korea has remained at the top since 2000. For the index of terrestrial mobile wireless broadband subscriptions per 100 inhabitants, Korea was also top in 2011. Additionally, in 2009, Korea had the second highest amount of ICT goods trade after the United States of America (USA) (OECD, 2011a). The impact of ICT on Koreans' lives can be deduced from these statistics.

The use of ICT for medical information in the healthcare sector is also expanding (Harrison & Lee, 2006; Øyri *et al.*, 2007). Many studies identified that ICT enables an increase in the quality of care by enhancing the use of care guidelines, increasing disease surveillance, reducing medication errors and promoting cost-effectiveness as information management is key to care delivery in healthcare fields (Chassin & Galvin, 1998; Chaudhry *et al.*, 2006; Øyri *et al.*, 2007; Goldzweig *et al.*, 2009). A survey also reported that 86% of physicians in the USA used the internet to obtain health-related information (Parekh *et al.*, 2009), a trend also reflected in the nurse group (Estabrooks *et al.*, 2003). In the UK, the government has steadily increased investments in healthcare technology and more recently, the National Health Service (NHS) England decided to invest £78 million in technology in 2015 (National Audit Office, 2006; NHS England, 2015). As the NHS increasingly uses technology for the management and delivery of healthcare services, there is a demand for modern ICT systems (e.g. EMR, mobile devices and picture archiving and communication systems (PACS)), which are required to support high quality healthcare (e.g. improvement of rapid and effective

communication between medical staff to improve the safety of patient care (Toofany, 2006). The Korean government has also understood the importance of ICT in healthcare and encouraged the development of ICT systems in clinical environments. Investment in the healthcare ICT market consequently increased from approximately ₩200 billion (Korean Won; equivalent to £111 million) in 2005 to ₩300 billion (equivalent to £166 million) in 2010, an average increase of approximately 15% per year (Cho & Noh, 2013). Moreover, a further increase in the scale of investment in healthcare ICT is expected as the demand of ICT in healthcare fields has increased since 2010. The ICT market in Korea is largely categorised into three main systems, all of which enable health professionals to manage health information: 1) PACS, 2) EMR and 3) order communication systems (OCS) (Cho & Noh, 2013). The term 'EMR' is often used interchangeably with 'electronic health record' (EHR) in the literature, although each term has different properties (Caligtan & Dykes, 2011). As this research will frequently deal with this system, to avoid confusion, I will henceforth use the term 'EMR' instead of 'EHR'.

Although ICT has brought tremendous benefits to healthcare fields, some criticisms of healthcare ICT use are also evident. Several researchers have found that there may be conflicts between humanised healthcare and an over-reliance of ICT, which is perceived to obstruct patient-centred care (Webster *et al.*, 2003; Levett-Jones *et al.*, 2009). There are also concerns about overdependence on ICT, with McHugh (2004) recommending that health professionals should not expect that ICT can resolve all issues and problems in their practice. However, it is apparent that ICT creates a new paradigm in healthcare fields and is becoming essential for improving the quality of

care by enhancing healthcare professionals' decision-making skills, ensuring patient safety and reducing healthcare costs and medical errors. Thus, Toofany (2006) argued that, with ICT's expanding influence and increasing standardisation in healthcare service sectors around the world, healthcare professionals should embrace ICT and what it can offer, whilst staying alert to its limitations.

2.2.2. ICT in nursing care fields

Nurses have always used tools in their nursing practice. Throughout the history of nursing, knowledge building and nursing education can be characterised by the tools that have been used (Barnard, 1996, 2002). Toofany (2006) declared that nursing professionals cannot carry out their practice without using ICT as a significant tool. ICT has also been used widely in nursing education (Skiba *et al.*, 2008). Many researchers have reported numerous benefits of ICT in nursing practice and education (see Table 1).

Table 1. The advantages of ICT in nursing practice and education

Authors	Advantages
Meyer (1992), Simpson (2004)	ICT can reduce nurses' workloads, nursing shortages and medical errors
Breslin *et al.* (2004), Simpson (2004), Peck (2005), Rantz *et al.* (2005), Smedley (2005)	ICT can enhance the effectiveness of nursing care provided, by encouraging a higher level of interaction between nurses and patients and acute nursing care
Cole and Kelsey (2004), Desjardins *et al.* (2005)	ICT can support Evidence-Based Practice (EBP) by providing a rich stock of information, assuming that nurses and students have sufficient informatics literacy
Simpson (2004), Weber (2007)	ICT can assist clinical decision-making in nursing practice
Simpson (2004), Smedley (2005), Skiba *et al.* (2008), Button *et al.* (2014)	ICT can have a positive impact on nursing education by facilitating it
Breslin *et al.* (2004), Moss (2005), Fujino and Kawamoto (2013)	ICT can reinforce accurate communication between nurses or between nurses and other medical staff, especially by using mobile ICT

When nursing professionals embrace the advantages of using ICT as cited above, they can significantly improve patient safety and the quality of nursing care (Staggers *et al.*, 2002; Levett-Jones *et al.*, 2009). Thus, there has been a growing interest in ICT as the nursing role becomes increasingly complex with many roles and responsibilities focusing on the management of ICT (Almerud *et al.*, 2008; Zuzelo *et al.*, 2008). Moreover, being able to use ICT tools and manage information is becoming one of the indispensable competencies for nurses and nursing students as well as other health professionals in their practice and education (Westra & Delaney, 2008; Fetter, 2009a).

This context has promoted nursing professionals' attention on discussing nursing informatics. Many researchers and organisations in nursing fields such as Graves and Corcoran (1989) and the American Nurses Association (2008) have attempted to

define the meaning of 'nursing informatics'. The definitions of nursing informatics have changed over time and therefore, understanding the history of nursing informatics would allow us to have a grasp of how nursing professionals cope with the age of information.

One of the earliest definitions of nursing informatics when the term first emerged in the 1980s was:

> "*The use of information technology in relation to any of the functions which are within the purview of nursing and which are carried out by nurses. Hence, any use of information technology by nurses in relation to the care of patients, or the educational preparation of individuals to practice in the discipline is considered nursing informatics*" (Hannah, 1985, p181).

In this definition, the researcher's viewpoint was oriented towards nurses' applications of information technology. This view of nursing informatics was similar to other earlier definitions, such as the definition by Scholes and Barber (1980). However information technology-oriented definitions of nursing informatics were criticised as these overemphasised the role of technology, while conceptual definitions began to receive attention from nursing academia in the 1990s (Staggers & Thompson, 2002). Graves and Corcoran (1989) suggested a definition of nursing informatics that is now one of the widely accepted definitions in nursing journal articles addressing the topic of nursing informatics. Their definition reflected conceptual and integrative aspects of nursing informatics:

> *A combination of computer science, information science, and nursing science designed to assist in the management and processing of nursing data, information, and knowledge to support the practice of nursing and the delivery of nursing care* (Graves & Corcoran, 1989, p227).

The thing to notice in this definition is that they distinctly place an emphasis on nursing professionals dealing with nursing data, information and knowledge. Staggers and Thompson (2002) believed that Graves and Corcoran's (1989) definition changed the paradigm of nursing informatics to largely focus on information science, rather than on technology itself.

Many definitions of nursing informatics have also been introduced as modifications or rewordings of Graves and Corcoran's definition. (Turley, 1996; American Nurses Association, 2008)

Based on Graves and Corcoran's definition, Turley (1996) introduced a conceptual model with three dimensions (i.e. information, computer and cognitive science) within nursing informatics, particularly accentuating the significance of cognitive science in nursing informatics. Cognitive science is "*the science of mind*" (Stillings *et al.*, 1995, p. 1). Cognitive science assumes that human minds are complex systems that receive, save, extract, transform and share information (Stillings *et al.*, 1995). Therefore, the field of cognitive science includes humans' internal processing of information. In Turley's (1996) model, the intersection between information and cognitive science can be represented by the term 'cognitive informatics'. Cognitive informatics is the study of a human's internal processes in dealing with information and the inquiry into a human's mind and brain (Wang, 2003). When exploring cognitive science through Turley's (1996) nursing informatics model, a human's cognition in processing information for knowledge building can be ascertained to play a vital role in defining nursing informatics.

Most recently, the International Medical Informatics Association - Nursing

Informatics (IMIA-NI) (2009) updated their definition of nursing informatics as:

> *Nursing informatics science and practice integrates nursing, its information and knowledge and their management with ICT to promote the health of people, families and communities worldwide"* (n.p).

This definition also simply stresses the importance of information management, which is in both information and cognitive science areas.

Hitherto, this chapter explored the history of nursing informatics, the importance of ICT as a tool and its use by nursing professionals, resulting in benefits like improvement in the quality of nursing care and patients' safety. As the nature of information technology has evolved and nursing researchers' viewpoints towards nursing informatics have matured, the contemporary definitions have accepted the interdisciplinary and multidisciplinary characteristics of nursing informatics. Furthermore, the core concept of nursing informatics has moved from nurses' utilisation of tools (i.e. information technology devices) to their skills of information management, which is based on information and cognitive sciences, to create nursing knowledge (Sewell & Thede, 2013). Insofar as nursing informatics focuses on the two sciences, an investigation of nursing professionals' information processing (i.e., users' aspect) would be essential to take full advantage of technology as a tool.

2.3. Learning and ICT in nursing

2.3.1. Learning theories

The benefits of ICT in nursing practice have so far been discussed, but using ICT and

being competent in using ICT are also highly effective for building knowledge in nursing education.

Since the 1990s, nursing education has progressively used ICT because it allows not only flexibility and online nursing education, but also allows access to quality learning resources for nursing studies and EBP (Tanner *et al.*, 2004; Wade *et al.*, 2005; Levett-Jones *et al.*, 2009). Moreover, many nursing schools encourage students to use ICT during their nursing education, particularly in the clinical context, so as to develop informatics competencies and to prepare for using ICT as employed nurses in clinical environments.

To make better use of ICT for learning in nursing education, it would be valuable to understand learning through the theories behind it. Learning comprises of complex processes, and the study of these learning processes generates many interpretations and theories (Ertmer & Newby, 1993). Today, many learning theories exist. Each has its own message and valuable meaning in terms of the learning process (Glen, 2005). Although not all learning theories are adopted in the various educational fields, many scholars and educators have attempted to understand the theories because it informs them of education trends, and enables them to search for appropriate learning paradigms and improve instructional design in specific subjects and contexts of education (Keller, 1979; Cooper, 1993; Ertmer & Newby, 1993).

In recent times, three primary learning theories (i.e., behavioural, cognitive and constructivist theories) have been successively examined and discussed by many scholars and educators, as the modern trend of educational theory shifted first away from traditional behavioural learning theories (BLT) to cognitive learning theories

(CogLT), and now, to constructivist learning theories (ConLT) (Cooper, 1993; Ertmer & Newby, 1993; Ally, 2004).

It would be useful to discuss the development of learning theories in order to know the historic background and have a deeper understanding of ConLT. At the same time, each theory (i.e. BLT, CogLT and ConLT) has evolved and been modified for use in the current era. However, in order to trace the mainstream of the history of the learning theories, it is better to consider the traditional learning theories in a sequence. Thus, traditional BLT and CogLT, which will be discussed here, are different to current BLT and CogLT.

- **Behavioural Learning Theory**

BLT was influenced by Thorndike, Pavlov, and Skinner (Ally, 2004).

In order to understand BLT, it would be useful to know the definition of 'behaviourism'. Reber (1985, p. 86) defined behaviourism as an "*approach to psychology which argues that the only appropriate subject matter for scientific psychological investigation is observable, measurable behaviour.*" Moreover, since the definition mentioned scientific psychological investigation, behaviourists are interested in scientific methods and claim that their approach to reality is scientific. They also believe, as objectivists do, that "*hypothesis generation, experimental design and hypothesis testing*" are crucial factors for the approach. BLT reflects those beliefs (Cooper, 1993, p.12).

BLT suggests a precise learning process discovered by people's observable behaviour in complex learning processes. Since there are no available scientific methods to verify

humans' inner processes (Skinner, 1974), behaviourists attempt to concentrate on observable behaviour in order to prove learning processes by scientific methods (Ally, 2004), rather than as an abstract idea.

Although each behaviourist's idea regarding BLT varies in detail, they all maintain that the same key factors exist in order to establish human knowledge. The key factors of BLT are the stimulus and the response, and the relation of those two factors to each other (Cooper, 1993; Ertmer & Newby, 1993; Schunk, 2000; Hung, 2001). Behaviourists insist that learning takes place when the factors (i.e. stimulus and response) are united. Moreover, Skinner (1974) added one more key factor in the learning process: reinforcement. Reinforcement is a process that enables people to maintain and continue acquired behaviour by repeating their expected responses to stimuli. Reinforcement of desirable behaviour in response to external environments and experiences is 'fulfilled' rather than simply 'repeated', to increase the chances of certain responses to certain stimuli (Skinner, 1974). Therefore reinforcement causes both satisfactory mental conditions and changes in learner's behaviour, resulting in new learning.

Meanwhile, behaviourists ignore the inner processes of humans, believing that they are not meaningful as they are neither observable nor measurable. As a result, they believe that the learner is akin to a 'black box' that exists in between stimuli and responses. In other words, they believe that resulting behaviour from a stimulus goes through the 'black box', of which the inner processes are unknown and not of significance (Skinner, 1974).

Due to the rationale that inner processes do not possess meaning in learning as they are not observable or measurable, the BLT has been criticised by other educators, especially by cognitivists in the 1920's (Mergel, 1998). This is because all aspects of human behaviour cannot be explained by science alone.

- **Cognitive Learning Theory**

Behaviourists assert that standardised education should stress generalised knowledge, disregarding the involvement of the human consciousness in learning. However, many scholars and educators who discovered the limitations of behaviourism began taking interest in a more complicated cognitive process (i.e. the inner process, such as problem-solving, and thinking). Moreover, they felt the need to find a new theory that included recognition of individual differences (Snelbecker, 1974; Cooper, 1993; Ertmer & Newby, 1993). In response, the learning paradigm moved from BLT to CogLT, which is based on cognitive science (Ertmer & Newby, 1993; Ally, 2004).

Good and Brophy's (1990, p.187) definition of CogLT is significant in order to understand the cognitivists' learning paradigm and to distinguish it from BLT:

> "*Cognitive theorists recognize that much learning involves associations established through contiguity and repetition. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. However, even while accepting such behaviouristic concepts, cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans process and store information*."

Furthermore, CogLT focuses on the conceptualisation of learners' learning process and explains how students receive, organise and save information and knowledge in the internal process (Ertmer & Newby, 1993). In other words, CogLT is seen as a

series of processes by which learners receive information and knowledge from the external environment, and then save them into their mind's cognitive structure. In addition, learners' individual ideas, points of view, and motivation are one of the vital components in learning (Winne, 1985). Ally (2004, p. 7) also asserted that cognitive theorists "*claim that learning involves the use of memory, motivation, and thinking, and that reflection plays an important part in learning*". Therefore, learning is a result of learners' cognitive activities.

As compared to behaviourists, who focus on environmental design for the optimisation of information and knowledge delivery, cognitivists emphasise efficient internal processing strategies. Accordingly, CogLT stresses that cognitive learning makes knowledge meaningful, and it helps students to be able to organise new information and determine relationships between the pieces of information – all in order to make it easier to memorise knowledge (Ertmer & Newby, 1993). However, CogLT has been criticised because it views knowledge as absolute and objective, similar to behaviourists' ideas (Akinsanmi, 2010). Moreover, another criticism is that cognitive theorists see the whole learning process as exclusively mental activity and that they do not consider the influence of social and cultural contexts on learning (Bereiter, 1990).

- **Constructivist learning theory**

ConLT has received a significant amount of attention from many scholars today as social, ontological, and epistemological assumptions of learning have changed. In response, the learning environmental contexts have also dramatically changed

(Jonassen *et al.*, 2007).

Gray (1997) believed that the ConLT is:

> "*a view of learning based on the belief that knowledge isn't a thing that can be simply given by the teacher at the front of the room to students in their desks. Rather, knowledge is constructed by learners through an active, mental process of development; learners are the builders and creators of meaning and knowledge*" (n.p.)

As the learning paradigm shifted from BLT through CogLT to ConLT, external views of the learning paradigm moved to internal ones. The internal process of learning represents nothing to behaviourists, and to the cognitivists, learning is based on the internal mental activities that allow learners to understand knowledge and information, and then save it into their mind's cognitive structure. Constructivists, on the other hand, regard the internal process as the builder of symbols and their theory refers to the learners' reality (Jonassen, 1991).

Copper (1993, p.16) asserts that behaviourists and cognitivists see "*reality as external to the knower with the mind acting as a processor of input from reality…The constructivist, on the other hand, sees reality as determined by the experiences of knower*". In other words, constructivists emphasize the significance of the individual lived experience in learning processes (Dewey, 1916). Because it focuses on the individual, ConLT requires the learners to be active and reflective, as well as self-directed (Seels, 1989). Constructivists also assert that learning is a problem-solving process through individual discovery, and the motivation of learning intrinsically comes from each individual as well (Cooper, 1993). Constructivists, as cognitivists do, acknowledge that active roles and cognitive abilities of learners are an important factor

in learning. However, unlike the behaviourists and cognitivists, constructivists reject the concept of an external, objective reality, and instead, accept the personal interpretation of reality (i.e. the personal, subjective reality of each individual in the learning process) (Duffy & Jonassen, 1992; Cooper, 1993; Jackson & Sørensen, 1999).

Constructivists also believe that contexts are crucial components for constructing individual knowledge in the learning process (Vygotsky, 1978; Bereiter, 1990). Although behaviourists and cognitivists believe that environment is a vital concept in order to generate knowledge, constructivists assert that in addition to their environment, the learners themselves are an important factor in learning. Learning occurs when learners interact with their environment (Vygotsky, 1978; Ertmer & Newby, 1993). Constructivists also stress flexible utilisation of acquired knowledge by recalling the knowledge, rather than applying the knowledge immediately (Spiro *et al.*, 1991). Thus, constructivists believe that absolute knowledge does not exist in learning, as knowledge changes constantly through the learners' interpretations, individual experience, and his/her context (i.e. there is no objective reality in knowledge) (Ertmer & Newby, 1993).

Thus far, all three theories of learning have been examined and compared against one another. Ertmer and Newby (1993) believed the three theories of learning each have a different viewpoint towards learning strategies: behaviourists' view of learning focuses on 'what' (i.e. facts), cognitivists stress 'how' (i.e. processes) and constructivists emphasise 'why' (i.e. higher level thinking in learning). As asking both 'what' and 'how' allows one to be able to ask 'why', it is important to note that for the constructivist viewpoint to be properly achieved in the higher educational field, both

BLT and CogLT should also be given due consideration to achieve holistic learning.

As the education paradigm has shifted from traditional BLT to ConLT, the centre of instructional strategies has also shifted, not only from teaching to learning, but also from the passive acquisition of generalised knowledge to the acquisition of interpreted knowledge by a learner, who then applies the acquired knowledge to new contexts (Ertmer & Newby, 1993). However, focus on the individual has brought complexity to the learning process (Robinson, 1979). As a consequence, researchers and educators are forced to resolve the complexity. In particular, as ICT rapidly develops, they need to offer appropriate education strategies and provide solutions on how to effectively deal with learners' exposure to an excess of information. Fortunately, understanding the learning theories can be a bridge to overcome the complexity of learning (Ertmer & Newby, 1993). Moreover, many studies have traced the relationship between ICT and the constructivist paradigm, and explored their common features, but the job is incomplete.

Learning theories play a vital role in improving nursing education and practice (Underwood, 1987). Clinical placements are an essential part of formal nursing education compared to many other subjects that are taught in traditional classroom settings as nursing is a profession based on practice. Therefore, nursing educators blend educational methods, combining classroom-based education with clinical-based education. However, the gap between nursing knowledge that is acquired by classroom-based education, and nursing practice (i.e. clinical placements) is a chronic difficulty for nursing educators (Hewison & Wlldman, 1996; Severinsson, 1998; Landers, 2000). Although there is a gap between them, Ertmer and Newby (1993)

believe that learning theories will enable educators to find a suitable instructional design and technique, and to reduce the gap. Furthermore, the theories play an important role in facilitating learners' learning. Nursing educators and professionals should take responsibility to search for appropriate educational theories, and to apply those theories to their teaching in order to achieve quality education for students. The educational environment and paradigm have changed due to the rapid development of technology such as ICT (Cooper, 1993). This is because there is a close relationship between educational theories and the technology that supports them (Cooper, 1993).

2.3.2. Relationship between ICT and the constructivist learning theory

Sharples, Taylor and Vavoula (2005, n.p) stress "*every era of technology has, to some extent, formed education in its own image*".

Technology has transformed instructional methods and educational contexts, and it provides the vehicle for a new paradigm of education (Matusevich, 1995). As a result, the traditional methods of teaching are gradually disappearing, although they are still important in current educational fields. This shift is happening because those traditional educational tools and instructional methods are insufficient for the new paradigm, which focus on learner-centred education, self-directed learning, critical thinking, and the use of learners' information processing abilities to manage the high volume of information from the internet (Strommen & Lincoln, 1992).

How, then, has technology affected and changed the educational environment?

Collins (1991) reviews literature in order to identify the impact of new technology on education and he concludes that new technology changes educational trends as listed below in Table 2.

Table 2. The impact of new technology on education

• Pedagogy is changed from whole-class instruction to a small group one • Educators use coaching as their instructional strategy rather than lecture and recitation • Educators focus more on weaker students than brighter students • Students play a more active role in their learning process rather than being bystanders • Students are assessed by their products, progress, and effort rather than test results • Students are more cooperative and interactive with others rather than competitive • Students study different things at the same time (diversely) rather than the same things (uniformly) at the same time • Students integrate both visual and verbal thinking by employing technology rather than by only using the primacy of verbal thinking

The impact of technology can be seen when students are able to personally and selectively obtain information, and then build their knowledge from the deluge of information provided through developments in information technology, particularly ICT. Furthermore, they can interactively discuss and share their acquired information and knowledge with others such as peers and educators in a virtual space. Thus students can enhance their creativity and critical thinking when using this reflective and autonomous learning process (Collins, 1991; Strommen & Lincoln, 1992; Matusevich, 1995; Kafai *et al.*, 1997; Nanjappa & Grant, 2003). Returning to the primary theories of learning, many researchers and scholars (e.g. Jonassen *et al.* (1995), Matusevich (1995), Anderson *et al.* (1996), Duffy and Cunningham (1996), Brush and

Saye (2000), Nanjappa and Grant (2003)) have already discovered that ConLT is a suitable learning theory in technology-influenced educational environments. Collins (1991, p. 36) has also stressed that using technology "*entails active learning, and this change in practice will eventually foster a shift in society's beliefs toward a more constructivist view of education*". The reason is that the characteristics of ConLT have something in common with the technology in learning fields. Constructivists believe that knowledge is built on the basis of one's own experiences and interactions with others. Additionally, they support a learner-centred, reflective, collaborative, and critical learning process (Strommen & Lincoln, 1992; Jonassen *et al.*, 1995; Matusevich, 1995), as well as ubiquitous (Cha *et al.*, 2011) and lifelong learning (Beynon & Harfield, 2007). Moreover, Sharples *et al*. (2005, p.3) compared new learning and new technology, and interestingly, they concluded that those two new concepts strongly cognate with the characteristics of ConLT (see Table 3).

Table 3. The convergence between new learning and new technology with constructivist learning theory

New Learning	**New Technology**	**Constructivist Learning Theory**
Personalised	Personal	Individual
Learner-centred	User-centred	Learner-centred
Situated	Mobile	Mobility
Collaborative	Networked	Collaborative & Interactive
Ubiquitous	Ubiquitous	Ubiquitous
Lifelong	Durable	Lifelong

Tools are an integral part of the individual learning experience (Matusevich, 1995) and

constructivists think that learning occurs when students use tools to create experiences (Duffy & Cunningham, 1996). In other words, technology is a powerful tool. It supports the constructivist view of learning (i.e. learning by doing) and it guides the accomplishment of constructivist learning practices (Strommen & Lincoln, 1992; Rakes *et al.*, 1999). Thus many scholars equate technology to cognitive tools (Jonassen, 1994; Jonassen & Reeves, 1996; Nanjappa & Grant, 2003). However, it should be noted that although technology is a crucial tool for facilitating the learning process, the more important part of providing a broad education is to understand the values of learning through learning theories, rather than focusing on the technology itself. This is because the main role of technology is to achieve learning as a tool, and should not take the focus away from the learner and the learning process. Thus, technology used for learning needs to be considered from the theoretical learning viewpoint.

2.4. Healthcare delivery systems and undergraduate nursing education in Korea

Students in Korea have high ICT literacy. In 2009, Korean students achieved the top score in 'digital reading', which is related to ICT literacy, by a considerable margin over students from other countries in the Programme for International Student Assessment (PISA) (OECD, 2011b). This indicates that Korean students are expected to be more familiar with using ICT for their education than students in other countries, and ICT should be one of their most effective educational tools. Moreover, OECD (2012) names Korea as an exemplary country that has improved its quality of

education by utilising ICT. Based on this, as well as the substantial investment in healthcare technology in Korea, it is expected that Korean universities and their students would use ICT substantially in nursing education. Thus, recruiting Korean nursing students for this research, who have grown up amidst extensive ICT infrastructures, was expected to significantly contribute to understanding nursing students' learning with ICT.

As such, it would be useful to first explore the healthcare delivery system in Korea, as well as the nursing education systems. These backgrounds would offer a deeper understanding of nursing education, especially clinical placements, in Korea.

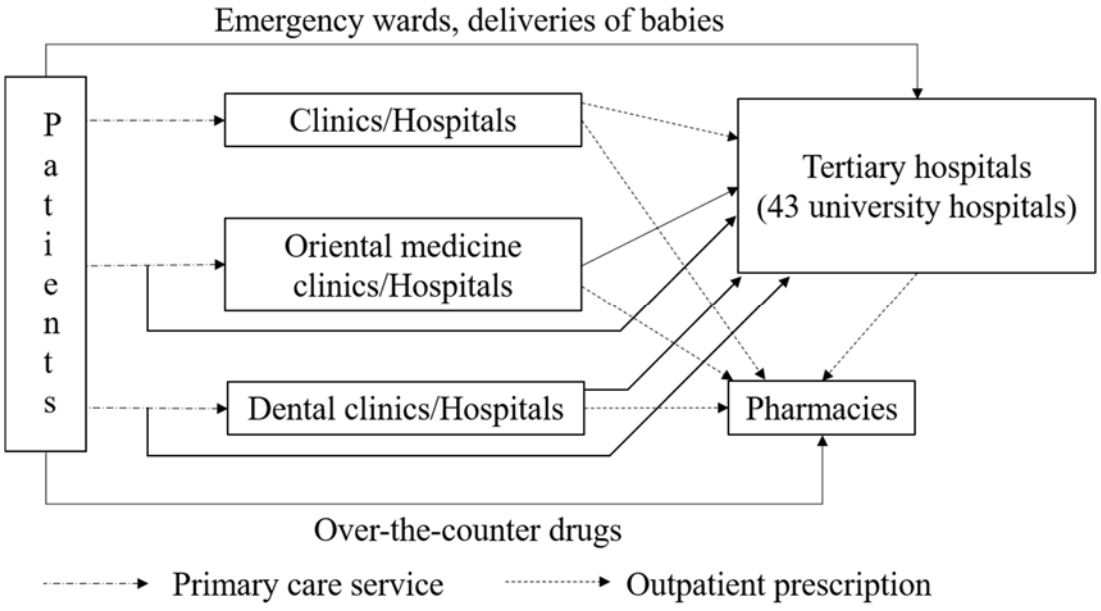
2.4.1. Healthcare delivery systems in Korea

Healthcare providers in Korea are categorised into three tiers (i.e., primary, secondary and tertiary care providers). The three tiers are largely divided by the number of medical specialities and of beds in a provider organisation (Song, 2013).

In general, primary care providers consist of private clinics and public health centres, and they only offer ambulatory care (Chun *et al.*, 2009; Song, 2013). Secondary care is provided by hospitals and general hospitals. Hospitals have more than 30 inpatient beds, while general hospitals have more than 100 inpatients beds and offer both ambulatory medical services and hospitalisation services in more than seven medical specialties (WHO, 2012). The tertiary care providers, called tertiary hospitals, satisfy the general hospital criteria but these hospitals have more than 500 beds, provide more specialised healthcare, and conduct research and teaching (Chun *et al.*, 2009; Song,

2013). Tertiary hospitals are expected to deal with patients who require complex healthcare interventions and are mostly operated by universities (Chun *et al.*, 2009). In Korea, 44 tertiary hospitals exist, 43 of which are university hospitals (Korea Health Industry Development Institute, 2009). In the Korean healthcare delivery system all patients are encouraged to seek healthcare services in increasing order from primary to tertiary care providers, however, they are under no obligation to follow the order. Instead, they have the freedom to choose any provider of any tier at an extra charge. When patients visit tertiary care providers, they are required to submit a referral letter, written by a doctor in primary or secondary care. Without the referral letter, patients can still access tertiary care providers, but will have to pay full charges and not receive the benefits from the national health insurance, with the exception of some cases, such as emergency care (Chun *et al.*, 2009; Korea Health Industry Development Institute, 2009), (also see Figure 1).

Figure 1. Patient pathway in the National Health Insurances system in Korea (Chun *et al*., 2009, p.113)



Due to the freedom given in choosing care providers, there is an imbalance of medical service across Korea. For any health problems, even minor illness, many Koreans tend to choose what they perceive to be the best hospitals (The Economist, 2011). Thus, compared to primary care providers, tertiary hospitals are generally struggling to manage their patient loads. Moreover, over 80% of healthcare providers gravitate to urban areas (WHO, 2012). As a result, there is an imbalance and inequality of healthcare services in Korea.

2.4.2. Undergraduate nursing education system in South Korea

In Korea, students have to complete either a three-year associate degree programme or a four-year baccalaureate degree programme in order to become a nurse. Moreover, they must pass a national examination for nurses directly after the programme (OECD, 2012a). The number of nursing schools in Korea has rapidly increased over the last two decades. As of 1999, only 113 nursing schools (i.e., 65 associate degree programmes and 48 baccalaureate degree programmes) provided nursing education (Kim *et al.*, 2000). By 2010, 60 nursing schools were newly established (i.e., total 173 nursing schools) (OECD, 2012a). As of 2015, a total of 201 institutions offer nursing degree programmes, and of those, 175 institutions grant baccalaureate degrees, while the remaining 25 institutions grant three-year associate degrees (Korean Nurses Association, 2015). The numbers indicate a trend of a reduction in schools offering three-year associate degrees and a significant increase in schools providing four-year baccalaureate degrees. The Korean Nurses Association announced a nursing education reform, whereby both degree programmes unify into one four-year baccalaureate

programme, so as to enhance the quality of nursing education by further developing nursing students' competencies (KABNE, 2012; Lee & Moon, 2013). Accepting the guidelines of the reform, many nursing schools granting associate degrees have moved up to offer four-year baccalaureate programmes (KABNE, 2012). Moreover, nursing schools with existing four-year baccalaureate programmes are also recommended to accept the guidelines to become accredited (KABNE, 2012).

For most of the nursing schools that have accepted the guidelines from the KABNE, their curricula should meet the criteria set for the baccalaureate programme. The KABNE (2012) recommends that nursing students should earn at least 25 credits of liberal art courses, such as English conversation and general computer utilisation. They also need to complete between 18 to 26 credits of foundation nursing courses. These foundation courses include natural sciences (e.g., pathologic physiology and anatomy), as well as humanities and social sciences (e.g., understanding human psychology and human relations approach). In particular, a minimum of eight credits or more in humanities and social sciences is required. Finally, between 70 and 90 credits are required for main nursing courses, including paediatric, adult and mental health nursing. According to a research study, for 10 nursing schools in Korea, the total average credits to graduate with a four-year undergraduate degree is 135.8 credits (Kim *et al.*, 2011).

2.4.3. Nursing clinical education in Korea

Based on above curricula, nursing education can be divided into two: nursing theory

education and nursing practical education. Nursing theory education usually takes place in classrooms using the instructional method of lectures, which makes up a large proportion of the nursing education over four years. This method focuses on delivering information, and nursing students are required to perform rote memorisation of the given information (Shin *et al.*, 2006). Nursing practical education has a different nature to classroom learning. One of the main goals of nursing education would be to equip students to with essential nursing practice competencies. Thus nursing students are given opportunities to conduct experiential learning in university laboratories and/or real clinical environments in order to develop their practical competencies. This education can also be divided into two parts: fundamental nursing education in university laboratories and clinical placements in clinical environments, which can also be called clinical education, clinical practicum, clinical training and practice placements. In Korea, nursing students carry out the fundamental nursing education during the second year of an undergraduate nursing programme, and then clinical placements from the third to fourth year (Lim, 2011). The RCN (2010, p. 1) defined nursing clinical placements as "*where a nursing or midwifery student applies their knowledge to practice, learns key skills and achieves the required competencies for registration. Learning in the contextual setting of clinical practice enables you to confront many of the challenges and issues related to caring*". In a Korean study, Yang (2012) defined placements similarly as a process for students to apply their knowledge of nursing theory and skills, acquired during university learning, to real clinical environments. In other words, clinical placements are a nursing course in which nursing students are given opportunities to apply their theoretical knowledge in real clinical contexts to nurture their clinical competencies (i.e., practicing nursing skills in

clinical environments) before being a nurse. Nursing students in Korea are required to spend 1000 or more hours on clinical placements and earn between 22 and 24 credits as part of the main nursing courses (i.e. 70 to 90 credits) (KABNE, 2012). Although clinical placements are vital curricula, many research studies in Korea such as Lee, Eom*, et al.* (2007) and Lim (2011) reported that nursing students struggle during their clinical placements due to their limited nursing practice. Furthermore, due to the increase in nursing schools in Korea, many nursing schools struggle to look for appropriate clinical placement sites and to secure the scheduling of clinical placements (i.e., 1000 hours or more) (Song & Kim, 2013; Park *et al.*, 2014). Particularly, nursing schools located in suburban or rural areas experience more difficulties to find sites as the majority of hospitals in Korea are concentrated within urban areas, especially in Seoul (Kim, 2013).

Meanwhile, in many international nursing studies such as Xu *et al.* (2000), Sharif and Masoumi (2005), Levett-Jones *et al.* (2007) and Yamada and Ota (2012), it is generally accepted that clinical placements are indeed an essential part of nursing education. By undertaking clinical placements, nursing students are expected to become equipped with problem-solving skills as a clinical competency (Scheetz, 1989; Ehrenberg & Häggblom, 2007). Additionally, this clinical experience can strongly influence the building of their professionalism in nursing fields and help them to smoothly transition and adjust to the workforce after qualifying as a nurse (Nolan, 1998; Dinmohammadi *et al.*, 2013). Warne *et al.* (2010) reported that in nine European countries, up to half of the students' nursing education can be taken up by clinical placements and this education is mostly provided by nursing staff in clinical environments, rather than

university lecturers who play a more indirect role in the clinical education (Barrett, 2007; Stokes & Kost, 2012). That is to say that nursing students spend many hours with nurses in clinical environments and that nurses play a key role in nursing students' clinical education. However, reports in international nursing literature indicated that many nursing students experienced difficulties with adjusting to and with learning in clinical environments due to the lack of clinical experience, limited chances to apply their knowledge to practice, and the unfamiliarity and complexity of clinical environments (Scheetz, 1989; Nolan, 1998; Sharif & Masoumi, 2005; Lapkin *et al.*, 2010). This is similar to the abovementioned findings of Korean studies. These difficulties are connected to their lack of clinical competencies, and increase the students' anxiety in clinical environments (Scheetz, 1989; Sharif & Masoumi, 2005). Napthine (1996) stressed that the quality of clinical nursing education determines the calibre of nursing education. Thus, the difficulties should be addressed for the improvement of nursing education.

In order to compensate for the challenging clinical placement situation, high fidelity SBL has been highlighted and many nursing schools in Korea have adopted this. Moreover, the KABNE (2012) proposed that a maximum of 10% of the stipulated time for clinical placements (i.e., 100 hours) can be replaced by SBL. Thus, SBL has been popular with nursing schools in Korea. Moreover, many research studies such as Decker *et al.* (2008) and Lewis *et al.* (2012) have reported the advantages of high fidelity SBL (e.g. encouraging nursing students' critical thinking and reflective learning, enhancing their self-efficacy as well as confidence of clinical competencies and learning without direct risks to patients).

2.5. Conclusion

Hitherto, technology, specifically ICT, and its use in healthcare fields have been explored. ICT has been utilised by nursing professionals as an effective and powerful tool to support their practice and education, despite it also having its disadvantages. The influence of using ICT in nursing fields promoted the attention on nursing informatics, in which there is a growing focus on the learner's cognitive domain of information processing by using ICT, rather than focusing on ICT itself. Accordingly, it becomes crucial to understand how the learner uses ICT.

As an objective of this research is to explore nursing students' learning, learning theories were discussed, focusing on ConLT, so as to offer a base for understanding nursing education. Based on this understanding, nursing educators can improve nursing education by making instructional design changes as necessary and contribute to reducing the gap between nursing theory and practice. This research also identified that ConLT can support the learning influenced by ICT.

The Korean healthcare delivery system and particularly the undergraduate nursing education have been described to provide understanding of the contexts for nursing students' learning, especially with ICT. Nursing students' difficulties in learning in clinical environments were identified, despite clinical education being a core nursing education. It has been put forth that the difficulties can be diminished by understanding the students' placement experiences in clinical environments, thereby improving their clinical education. Through exploration of the students' learning dynamics in ICT-influenced clinical environments, an understanding of how to maximise using ICT as an educational tool can be achieved.

This chapter provided the background of this research using available literature. This background literature review was conducted prior to data collection and analysis of this research by focusing on initial research topics: understanding nursing students' experiences in using ICT in clinical environments. Namely, the use of ICT was the central topic of this research and accordingly the literature review in this background chapter focused more on the ICT. However, during the data collection and analysis, the nursing students' learning process was extended upon, as it was discovered to form the basis of their use of ICT during clinical placements. Literature related to the new topics that arose from the data are described and critiqued in the discussion chapter. More details of the literature review are provided as part of the methodology of this research, which will be discussed in the following Chapter Three (see *3.3.9. Conducting the literature review under the Grounded Theory approach*).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Research strategies

This research was designed firstly, to discover the dynamics of how nursing students build nursing knowledge using ICT in complex clinical contexts and secondly, to construct a suitable nursing theory of learning based on the understanding of the dynamics. This research recruited third- and fourth-year nursing students studying at universities in Seoul, Korea, and have experienced clinical placements. The reason for conducting this research in Seoul, Korea is detailed under '*2.4. Healthcare delivery systems and undergraduate nursing education in Korea*'.

The first phase of this study conducted a survey in order to discern the students' attitudes towards ICT (i.e. the quantitative research). Following that, the second phase of this research collected qualitative data with a sub-sample of the same participating nursing students' regarding their methods and experiences of knowledge building, via intensive interviews and memos. The research strategy of employing both qualitative and quantitative research in one study is called 'mixed method research'. When rigorously conducted, it is a stronger research strategy than single method design. As the research accepts two or more points of view, it offers a richer understanding of the research questions and is able to compensate for the limitations of a research design through another research design (Morse & Niehaus, 2009). The mixed method research is one of the popular research strategies in nursing fields (Parahoo, 2006). Many social researchers have taken an interest in the mixed method research and reported its advantages and disadvantages such as Campbell and Fiske (1959), Sieber (1973), Johnson and Onwuegbuzie (2004) and Tashakkori and Teddlie (2010). It will

be particularly valuable to keep in mind Johnson and Onwuegbuzie's (2004) concise and clear list of the advantages and disadvantages of mixed method research (see Table 4).

Table 4. Strengths and weaknesses of mixed method research (Johnson & Onwuegbuzie, 2004, p.21)

Strengths	***Weaknesses***
• *Words, pictures, and narrative can be used to add meaning to numbers* • *Numbers can be used to add precision to words, pictures, and narrative* • *Provides quantitative and qualitative research strengths* • *The researcher may generate and test a grounded theory* • *Answers a broader and more complete range of research questions because the researcher is not confined to a single method or approach* • *In a two-stage sequential design, the Stage 1 results can be used to develop and inform the purpose and design of the Stage 2 component* • *The researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both methods in one research study* • *Can provide stronger evidence for a conclusion through the convergence and corroboration of findings* • *Can add insights and understanding that might be missed when only a single method is used* • *Can be used to increase the generalisability the results* • *Produces more complete knowledge*	• *Can be difficult for a single researcher to carry out both qualitative and quantitative research, especially if two or more approaches are expected to be used concurrently; it may require a research team* • *The researcher has to learn about multiple methods and approaches and understand how to mix them appropriately* • *Methodological purists contend that one should always work solely within either a qualitative or a quantitative paradigm.* • *More expensive* • *More time consuming.* • *Some of the details of conducting mixed research remain to be worked out fully by research methodologists*

Researchers who want to apply a mixed method research strategy have to decide both 1) "*whether one wants to operate largely within one dominant paradigm or not*", and

2) "*whether one wants to conduct the phases concurrently or sequentially*" (Johnson & Onwuegbuzie, 2004, p.20). In particular, the decision to use either a concurrent or sequential design is affected by the time ordering between qualitative and quantitative research (Johnson & Onwuegbuzie, 2004). In other words, if both research is conducted at the same time, it is the concurrent design, whereas if each research is conducted one after the other, it is the sequential design. Similarly, Morse and Niehaus (2009) stressed that the research consists of two parts: 'core component' and 'supplement component' and the core component is always a dominant method in a research study. Moreover, they also recommend that the researcher should decide the order of each component (i.e., concurrently or sequentially).

For this research study, I 1) used qualitative-dominant mixed method research (i.e. focusing on the qualitative research strategy as the core component and the quantitative one as the supplement component), and 2) conducted the research in sequential phases, not concurrent (i.e. conducting quantitative first, followed by qualitative. Results of both were compared in the result chapters in this research).

Since this research focused more on the qualitative research strategy as the core component, it is important to explore what qualitative research is. Many researchers and scholars have attempted to define the meaning of qualitative research and it would be easy to recognise that there are a number of different definitions. Moreover, the definition may change as time passes by. This is because the characteristics of the qualitative research are the result of the observers' individual theoretical backgrounds and the shifting trends of the social paradigm through the ages. Thus, Creswell (2007, p.37) defined the qualitative research as:

> *"Qualitative research begins with assumptions, a worldview, the possible use of a theoretical lens, and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem. To study this problem, qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is inductive and establishes patterns or themes. The final written report or presentation includes the voice of participants, the reflexivity of the researcher, and a complex description and interpretation of the problem, and it extends the literature or signals a call for action."*

Furthermore, compared to the quantitative research strategy, which focuses on finding factors of generalisation among people, qualitative research is one of the research strategies that significantly deals with each individual's experience and context (Parahoo, 2006). Thus, qualitative research is useful to enhance an in-depth understanding of human beings' complex behaviour in a certain context, although the results of qualitative research are difficult to generalise and it takes more time to collect and analyse data. Additionally, qualitative research is useful for constructing a suitable theory in specific research fields (Johnson & Onwuegbuzie, 2004; Parahoo, 2006; Weaver & Olson, 2006).

This research project also employed a quantitative research strategy in a supplemental role. The quantitative research strategy is useful in testing existing knowledge and theories, to generalise findings, and to discover the causality between research variables (Johnson & Onwuegbuzie, 2004). However, this strategy is more suitable to test a specific theory than to construct a theory (Glaser & Strauss, 1967). As this research sought to construct a theory, the quantitative research strategy was used in this research only to 1) understand nursing students' attitudes regarding ICT, 2) support accurate and meaningful interview questions for the qualitative research phase, thereby increasing the quality of this phase by ensuring focussed questioning, as well as

reducing time and saving money when collecting data, and 3) find active participants for the qualitative research phase. In addition, during the quantitative data collection, it was expected that I would have a better understanding of the research field and participants (i.e., theoretical sensitivity) and based on that understanding, would be more informed on how to develop the interview questions.

The results of the quantitative research, as previously mentioned, were only interpreted alongside the results of the qualitative research, and were not used for the development of interview questions. However, the narrative comments at the end of the survey were used to inform the development of the interview questions. This quantitative survey was constantly utilised for comparison to the qualitative findings, which is one of key concepts of Grounded Theory (GT) methodology when a theory is being constructed. Thus the survey for quantitative research was used to support the qualitative research.

3.2. Quantitative research

According to the sequence of data collection in this study, quantitative research will be described first.

Glaser and Strauss (1967) assert that quantitative research can be utilised as a supplement to qualitative research and it may support the efforts in developing a theory since its data provides a point of comparison for other data in GT. They also emphasise flexible uses of quantitative research in helping to construct a theory (Glaser & Strauss, 1967).

The survey method is valuable for collecting a wide scope of data within a short period from many samples (Parahoo, 2006). Moreover, a survey tool questionnaire has been used in order to "*collect information on facts, attitudes, knowledge, beliefs, opinions, perceptions, expectations, experiences and behaviour of client and staff*" (Parahoo, 2006, p.285). Thus it would be a directly relevant method to this research project's aim and objectives.

Before data collection during this quantitative research, an instrument that ensures reliability and validity should be selected and used in order to measure nursing students' attitudes towards ICT. Therefore, this research adopted an instrument that was developed in the UK, called the Information Technology Attitude Scales for Health (ITASH). As this research employed different samples from the ITASH (i.e., Korean participants), I newly developed an instrument, based on the original ITASH, using a statistical strategy of factor analysis as the first step in measuring the nursing students' attitudes. In this section, the background of an instrument development will be briefly discussed and then the process of the instrument development and measuring of the attitudes will be demonstrated.

3.2.1. Background: Prior instruments regarding technology attitudes in nursing

Insofar as ICT devices have been widely adopted in healthcare fields, it is important to pay them adequate attention. However, Stronge and Brodt (1985) argued that the influence of user factors should not be underestimated and ignored. Similarly, many

serious problems such as medical errors can arise when the application of ICT in clinical environments focuses only on the devices and does not consider the users (Stronge & Brodt, 1985; Ward *et al.*, 2008). Thus, human factors, such as attitudes towards ICT, should be explored and quantified with reliable and valid instruments.

A comprehensive literature review was conducted using the databases CINAHL Plus, PubMed, Medline and Google scholar, with four key words: nursing, attitudes, technology and instrument. Although many studies ascertaining nursing professionals' attitudes towards ICT have been conducted, instruments that have been specifically developed for use in the nursing field were few and far between.

Nurses' Attitudes Toward Computerisation (NATC), developed by Stronge and Brodt (1985), is one of the popular instruments. A pilot study with 48 nursing students identified 20 items stemming from six major issues: job security, legal ramifications, quality of patient care, capabilities of computers, employee willingness to use computers and benefits to the institution. The study computed a split-half reliability coefficient as $r = 0.90$ (Stronge & Brodt, 1985). Follow-up studies adopting the NATC instrument, such as Schwirian *et al*. (1989), Scarpa *et al.* (1992) and Stockton and Verhey (1995), used larger and different sample sizes, yet reported disparate results, with variations in the naming and/or numbers of factors.

Another commonly used tool is the Nurses Computer Attitudes Inventory (NCATT), developed by Jayasuriya and Caputi (1996). Items in NCATT were derived from a panel review and a comprehensive literature review. They collected data from both nursing students and nurses and identified 22 items and three factors: 'computers and patient care', 'computer anxiety' and 'patient confidentiality and computers', using an

exploratory factor analysis (EFA). NCATT demonstrated adequate overall reliability (Cronbach's α = 0.95) and concurrent validity, using the Computer Attitude Scale, developed by Dambrot *et al.* (1985).

Another study by Sinclair and Gardner (1999), drawing on the Computer Attitude Scale developed by Loyd and Gressard, (1984), was conducted using nursing student participants. This study extracted three factors: 'confidence in using computers', 'motivation to use computers' and 'perceived career-related importance of computers', with 19 items by EFA and achieved satisfactory reliability for each factor (Cronbach's α =0.90, 0.81 and 0.75, respectively). However, the validity of this instrument was not reported.

The tools discussed above for measuring attitudes towards technology in nursing fields were developed in the 1990s. However, healthcare technology has developed rapidly and new clinical environments have emerged with more contemporary and complex technologies. Therefore, the tools used in the 1990s are unlikely to be appropriate for use in the current era.

More recently, Maag (2006) modified the Technology Attitude Scale (TAS), developed by McFarlane *et al.* (1997), to perform a national survey in the USA so as to identify nursing students' attitudes towards technology. Maag used EFA to identify two factors, 'confidence in and the benefits of using technology' and 'lack of self-efficacy in the use of technology', with 15 items. The instrument reported acceptable overall reliability (Cronbach's α= 0.89). However, Maag (2006) did not report the validity of this research.

In the same year, 2006, the ITASH was developed to assess health professionals' attitudes towards ICT, particularly nurses' attitudes in the UK (Ward *et al.*, 2006). Ward *et al.* (2006) identified 71 statements from relevant literature, which were then analysed using EFA, wherein 48 items were grouped into three factors, namely 'efficiency of care' with 17 items, 'education, training and development' with 17 items and 'control' with 14 items. The reliability of each factor was assessed as Cronbach's α=0.88, 0.70 and 0.83, respectively. Concurrent validity of each factor was also evaluated. For 'efficiency of care', concurrent validity was investigated using a comparison with the NATC scale (Stronge & Brodt, 1985). The validity of the other two factors was ensured through further qualitative interviews with participants.

To summarise, the measurement of nurses' and nursing students' attitudes towards ICT is vital, but it remains difficult to identify the factors underpinning attitudes, as many of the current studies have indicated that attitudes towards ICT is often associated with diverse and complex factorial structures (Ward *et al.*, 2008). Although some of the instruments reported their validity, many did not and thus the controversy surrounding their validity still remains; this issue should be addressed, as ensuring clear validity is essential for developing effective instruments (DeVon *et al.*, 2007).

3.2.2. Quantitative methodology: Cross-sectional study

A cross-sectional study was designed to develop the shortened version of ITASH, so as to assure its validity and reliability, and to analyse nursing students' attitudes towards ICT. The instrument development process was conducted in two phases: The

first phase assessed the content validity, which included a pilot study and facilitated the translation of the instrument from English into Korean; the second phase tested and validated the instrument developed in the first phase, using factor analysis. After the development, the participants' attitudes of ICT and frequency analyses of the use of ICT were assessed using the ITASH.

3.2.3. Quantitative data collection

3.2.3.1. Adaptation of ITASH

This study adopted the instrument, ITASH (see Appendix 1), because it met the following criteria: 1) developed in nursing fields after 2000, 2) dealt with ICT in clinical contexts and 3) assured reliability and validity. Other instruments, such as those containing factors related to EMR, or those that did not report validity or only assured content validity were not considered in this study.

For this research, permission to use and modify the ITASH was granted by Rod Ward, the main developer of ITASH (see Appendix 2).

- *Step I: Reviewing ITASH contents*

All 48 items in ITASH were investigated for content validity by a panel of experts, including two senior educators in the healthcare field and one nursing researcher in the ICT profession. Four items (Q36, Q38, Q43 and Q45) that were not relevant to ICT, were initially eliminated by the panel. Furthermore, some words in the ITASH questionnaire were slightly modified (e.g., 'computers' was replaced with 'ICT

devices'), in order to ensure more accurate and precise meanings. This modified ITASH using 44 of the 48 original items employed a four-point Likert scale (1 = strongly disagree to 4 = strongly agree) and also included demographic questions and other questions to improve the data collected (see Appendix 3). After modifying the ITASH, its contents were reviewed in a pilot study by four nursing students (see *3.2.3.2. Participants of quantitative research*). All four participants confirmed the applicability of the instrument for nursing students.

- *Step II: Translation*

Following confirmation of the test's applicability, the instrument, originally written in English, was translated into Korean as Korean nursing students in Korea were invited to participate in this study. When adopting a questionnaire with a different language in cross-cultural research, the translation process of the questionnaire should be identified and clarified to ensure the validity and quality of the research (Maneesriwongul & Dixon, 2004; Sperber, 2004). Two professional translators, one nurse and one nursing student both bilingual and fluent in English and Korean were involved in this process. Both the nurse and the nursing student were involved as a way to ensure the semantic aspect of the translation within a clinical context.

The process of translation in this study consisted of eight steps as follows (also see Figure 2):

1) Translation of the ITASH, which is written in English, to Korean by a professional Korean-English translator (PhD in English literature) and a bilingual British-Korean nursing student,

2) Identification of discrepancies between the two Korean versions, and then re-translation of the discrepant parts until an agreement was formed between the two translators and myself (this process was repeated twice),

3) Back-translation from the translated the ITASH in Korean into English by another professional Korean-English translator (PhD candidate in English education) and a bilingual British-Korean nurse working in the UK,

4) Identification of discrepancies between the two back-translated versions in English, and then re-translation of the discrepant parts until an agreement was formed between the two translators and myself (this process was repeated once),

5) Comparison of the three versions of the ITASH (i.e. the original English, the translated Korean, and the back-translated English versions) by the four translators and myself,

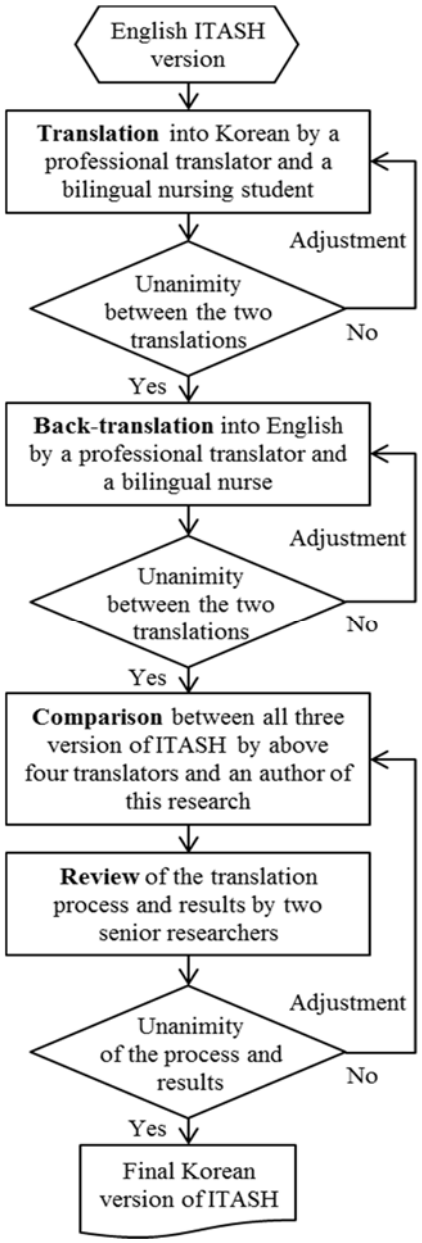
6) Review of the above translation process and results by my two research supervisors before receiving a recommendation for minor corrections in the back-translated version,

7) Modification of the translated version by the four translators and myself, whilst taking recommendations from my research supervisors into consideration, before sending the modified translated version back to the my research supervisors for another review,

8) Consent of all steps by all persons engaged with the translation process and then officially notarising the Korean version of the ITASH at the Embassy of the Republic of Korea (i.e., Korea) in the UK by comparing the English version of the ITASH

with the Korean one as a final stage.

Figure 2. Translation process of the ITASH (Lee & Clarke, 2015, p. 1185)



3.2.3.2. Participants of quantitative research

This research recruited Korean nursing students as its participants.

The original ITASH recruited qualified nurses as participants, thus it follows that the

suitability of the instrument should be assessed for nursing students. To this end, four third-year nursing students at a university in the UK, who had experienced clinical placements, were invited to review the instrument in a pilot study. These pilot study participants were all British, although two of them were Korean-born migrants. The Korean-born migrant participants played two important roles, 1) examining the suitability of the instrument and 2) accounting for cultural differences that may arise in administering the instrument to Korean students. As a result, they raised several minor issues unrelated to cultural differences, such as requiring a clear definition of 'organisation' in the questionnaire to clarify whether it referred to university or hospital. I accepted their recommendations and amended the questionnaire. Cultural differences in the contents of questionnaire were not indicated by the Korean-born migrant participants.

In the second phase, two convenience sample groups of nursing students from Seoul, Korea were identified; the first were recruited from three universities for EFA (423 participants invited) and the second, from another three different universities for confirmatory factor analysis (CFA) (234 participants invited). The recruited nursing students all met the following inclusion criteria: 1) nursing students who were studying at the end of third or fourth year in a four-year nursing baccalaureate program in Seoul, Korea and 2) nursing students who had experienced placement in a clinical setting. The exclusion criterion included those registered nurses currently in a program to earn a bachelor's degree. To ensure consistency, I visited all six universities and asked nursing students for their participation in this research, providing an explanation of the purposes of the research. The data were collected from October 2012 to December

2012. Paper-based ITASH questionnaires were used as a way to eliminate the biases of internet-based questionnaires, as it was assumed that internet-based questionnaires could influence the responses of attitudes towards technology. After collecting the data, twelve questionnaires with over five uncompleted items were excluded. In total, 346 and 162 participants were selected for EFA and CFA analysis, with a response rate of 82% and 69%, respectively.

3.2.4. Quantitative data analysis

Statistical analysis on the data collected from the ITASH was undertaken for factor analysis using Statistical Package for the Social Sciences (SPSS) version 19 with R-Factor (V2.2.1) for EFA and Linear Structural Relations (LISREL) version 8.8 for CFA. Statistics programs are commonly used to analyse quantitative data (Parahoo, 2006). Prior to the analysis, responses to negative questions were reverse coded.

This analysis was divided into two types, EFA and CFA. As its name specifies, the main aim of EFA is to explore the covariance among latent variables for identifying superordinate domains (Cudeck, 2000; Hair *et al.*, 2010). Even though EFA and principal component analysis (PCA) are different statistical techniques, the methods have been treated as the same concept in many studies, particularly as the PCA technique has popularly been used under the name of EFA without an understanding of the differences between the two techniques (Park *et al.*, 2002; Schmitt, 2011; Gaskin & Happell, 2014). CFA is used for evaluating and confirming the suitability of the variables for a previously hypothesised factor structure (Floyd & Widaman, 1995).

As the correlation matrix plays a critical role in both EFA and CFA, the determination of a correlation method was prudent. Pearson correlation is one of the popular statistical techniques in social sciences, however this correlation is more suitable for continuous as opposed to ordinal data (Holgado–Tello *et al.*, 2010; Basto & Pereira, 2012). Even though some literature argues that it is incorrect (Jöreskog & Moustaki, 2001; Schmitt, 2011), many studies in social science have used Pearson correlation and treat ordinal data as continuous data in practical use, because Pearson correlation is available as a default in some popular statistical software (e.g. SPSS and AMOS) (Basto & Pereira, 2012). Unlike the Pearson correlation, polychoric correlation is a statistical method that enables the estimated correlation of ordinal variables (Lee *et al.*, 2012). Thus, polychoric correlation is a suitable technique to estimate the association between ordinal variables and was thus adopted in this study over the Pearson correlation. EFA was implemented in four phases:

1) Estimation of sample size and sampling adequacy

An appropriate estimation of a sample size is vital not only for reliable and valid results, but also with regards to ethicality (Gaskin & Happell, 2014).

Various guidelines of the estimation such as the ratio of participants to variables and the minimum absolute sample size have been introduced, but these various guidelines have been criticised as it caused many controversies such as a lack of rationale. Therefore, adopting multiple estimation methods of a sample size and then verifying factorability with the estimated sample size by Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) test would be reasonable.

Kline (1986) asserted that 100 or more participants is a preferable sample size. Furthermore, a minimum of five participants per variable is said to be acceptable (Hair *et al.*, 2010). Bartlett's test of sphericity was employed in this study as a way to identify sampling adequacy for factorability (Hair *et al.*, 2010). Assuming the hypothesis is not rejected, the sampling would be deemed unfit for EFA. The adequacy was also measured using the KMO test, wherein if the value of KMO is the same or higher than 0.50, the sampling adequacy is considered to be acceptable (Kaiser & Rice, 1974).

2) Determination of the number of factors to retain

During the EFA process, the determination of the number of factors to retain is more vital than the determination of extraction and rotation methods (Zwick & Velicer, 1986). For this, Horn's parallel analysis (PA) and Velicer's minimum average partial (MAP) are frequently recommended as the best empirical evidence (Zwick & Velicer, 1986; Ruscio & Roche, 2012).

PA has a higher accuracy of the determination, thus the adaptation of this method has been highly recommended (Zwick & Velicer, 1986; Basto & Pereira, 2012). For instance, Ruscio and Roche (2012) reported a simulation study where PA showed a high accuracy accounting for 76.42%. Meanwhile, when PA is used with ordinal data, Garrido *et al.* (2012) stressed that PA with polychoric correlation generates more accurate results than the Pearson correlation. Velicer (1976) developed the MAP method that is based on involving PCA followed by analysing partial correlations. Schmitt (2011) reported that MAP is one of the most accurate methods and the combination of PA and MAP is strongly recommended, as it outperforms other methods. The current research calculated these two analyses, PA and MAP, to

determine the number of factors to retain.

3) Decision of a factor extraction and rotation method

A suitable extraction method, which fits the purpose of its specific research objectives and methodology should be carefully implemented (Gaskin & Happell, 2014). The extraction method employed is determined based on the type of data collected (e.g., interval, nominal and ordinal) (Gaskin & Happell, 2014). This research used the minimum residuals (MNRES) extraction method that is equivalent to the unweighted least squares or ordinary least squares method (Polit, 2010; Lee *et al.*, 2012) with polychoric correlations. This was decided due to the fact that MNRES is deemed as an appropriate extraction method for ordinal data (as identified in a literature review undertaken by Gaskin and Happell (2014)). The purpose of rotation is purely to enhance the logical interpretation of the analysis as achieving a simpler and more meaningful factor solution (Hair *et al.*, 2010). The oblique rotation, particularly the oblimin rotation, was also adopted in this research, as oblique rotation methods assume that correlations between factors exist (Polit, 2010). This was further justified in that it was assumed there would be some identifiable correlations between the extracted factors, as at least some correlations typically exist within psychological and educational research (Schmitt, 2011).

4) Refinement of the factor structure and items

Factor loadings were considered in this research in order to verify the appropriate variables of each factor (Polit, 2010), as the higher loading variables in each factor ultimately determines the essence of the factor (Hair *et al.*, 2010; Polit, 2010). Factor

loadings of variables with values of 0.40 and above are considered to be satisfactory (Hair *et al.*, 2010). Internal consistency reliability was also examined. Ordinal coefficient α, developed by Zumbo *et al.* (2007) in their simulation study, was adopted for testing internal consistency reliability of each factor, as it is more accurate for estimating the reliability with ordinal data than Cronbach's α (Zumbo *et al.*, 2007; Liu *et al.*, 2010). The ordinal coefficient α is conceptually the same as Cronbach's α, but the ordinal one is based on polychoric correlation (Basto & Pereira, 2012; Gadermann *et al.*, 2012). The α value of 0.70 or higher was considered to be reliable in this research. Following statistical analyses, item contents in the extracted factors were reinvestigated by the panel for theoretical consistency of the contents in the each factor.

CFA followed EFA in order to verify whether the hypothesised structure from EFA was consistent and valid. The sample size for CFA was estimated. Over five times the number of variables are considered to be acceptable (Kääriäinen *et al.*, 2011) and the sample size for CFA should be at least, if not over, 150 samples (Anderson & Gerbing, 1988). This research used ordinal data, thus LISREL 8.8 was employed since it supports polychoric correlation, unlike AMOS. A number of estimations has been proposed in the literature for testing the fit between the factor structure and data. This study adopted the most popular fit indices of CFA, including the chi-square statistic, Root Mean square Residual (RMR), Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), the Normal Fit Index (NFI), Incremental Fit Index (IFI) and the Comparative Fit Index (CFI). In the chi-square statistic, a p-value of 0.05 and above represents the goodness of fit. Moreover, the normed chi-square is achieved by dividing a chi-square value by

its degrees of freedom (df) and a range between 0 and 3 is considered acceptable, while a lesser value is more preferable (Child, 2006; Hair *et al.*, 2010). Values for the GFI, AGFI, NFI and CFI range between 0 to 1 and the values over 0.90 and preferably 0.95 or higher are considered a reasonable model of fit (Hu & Bentler, 1999; Child, 2006; Hair *et al.*, 2010). When a sample size is under 250, as is the case in this study, and the number of variables range between 12 and 30, RMR and RMSEA of 0.08 or less are considered evidence for a reasonable fit (Hair *et al.*, 2010).

When the development of the ITASH was completed using the processes above, the ITASH was used to assess the participants' attitudes to ICT. Moreover, frequency analyses were measured using the supplement questions regarding the students' use of ICT.

Again, as mentioned before, the purpose of this questionnaire was for developing interview questions and gathering background data and information. Thus, the data from the questionnaire were used narrowly due to the project's limited time for in-depth data collection, analysis, and development of a theory, which is one of the main purpose of this research.

3.3. Qualitative research

3.3.1. Qualitative research paradigm

Notwithstanding this research used the mixed method research strategy (i.e., using heterogeneous paradigms between quantitative and qualitative research), the

qualitative research was dominant in this research (i.e., core component). Therefore, the main paradigm of this research was based on the qualitative research paradigm, and includes ontological and epistemological perspectives.

3.3.1.1. Ontological perspective

The term ontology denotes "*the nature of what is investigated*" (Hirschheim *et al.*, 1995, p.20).

The ontological perspective of this research was 'relativism'.

Over 2400 years ago, a famous philosopher Protagoras stressed that "*of all things the measure is man*" (Steidl *et al.*, 2005, p.317). It means that human beings are at the centre of the interpretation of the world. This statement would be valuable to relativists since it can inspire understanding of the core concept of relativism. Thayer-Bacon (2003, p. 417) defined relativism as "*relying on a view of reality as a function of human belief and truth as a function of human practice. If all truths are relative to the individual, and to the time and place in which s/he acts, then the logical result of relativism is that nothing can be proven right or wrong, therefore anything goes*." In other words, relativists deny the universal, eternal, and absolute truth about beliefs and principal, but attempt to understand beliefs and principals as relative truths. Furthermore, relativism is "*the general belief that knowledge is always dependent on the observations of an individual or social group*" (Doolittle & Hicks, 2003, p.19).

The main object of using relativism in this research was to understand each individual's subjective viewpoint and to acknowledge the differences between the

individuals in their complex (i.e. social and cultural) environments. Relativism forms the groundwork upon which social constructivism is built (Doolittle & Hicks, 2003), and constructivism itself is a suitable theoretical foundation to understand learning with the use of ICT. Thus, the ontological viewpoint of this study was to know how each nursing student, who constructed his/her reality and belief via their own experience, built nursing knowledge and used ICT in complex clinical contexts.

3.3.1.2. Epistemological perspective

Epistemology means "*all the nature of human knowledge and understanding that can possibly be acquired through different types of inquiry and alternative methods of investigation*" (Hirschheim *et al.*, 1995, p.20).

This research used 'social constructivism' as its epistemology.

Constructivism is a suitable epistemology for qualitative research and has greatly influenced and been applied to qualitative research in social science fields (Denzin & Lincoln, 2005). The cognition of constructivists is based on the individual's subjective experience. Constructivists believe that they can acknowledge the existence of the world by experiencing it and that rather than existing separately to human experience, the world is only given meaning by human beings. In social constructivism, social culture and context are specified to have an important impact on individual behaviour and knowledge building (Vygotsky, 1978), especially when compared to radical constructivism, which overlooks the role of society (i.e. they believe that knowledge can be constructed without a social context) (Anderson & Kanuka, 1999).

From an epistemological viewpoint, social constructivists are interested in social interaction in the process of knowledge building. Furthermore, they stress that knowledge is first constructed in social conditions, then knowledge is given meaning through an individual's interaction with the others (Fosnot, 1996). Kim (2001) asserted that social constructivism's fundamental assumption concerning reality, knowledge and learning is quite different from other kinds of constructivism, such as radical constructivism (see Table 5).

Table 5. The meaning of reality, knowledge and learning for social constructivists (Kim, 2001)

Reality	is not discovered but constructed through human beings' social activity and interaction
Knowledge	is also created through people's social activity and interaction. In addition, knowledge can be changed and modified through negotiation between members of society
Learning	is a social process, not an individual one. Effective learning takes place when each human being participates in their society

In social constructivism there is no objective reality and knowledge, but rather, reality and knowledge are constructed (i.e. given external meaning) and then revised as people interact with one another in society.

While nursing students build nursing knowledge in clinical contexts, they obtain nursing information, particularly through the use of ICT, and share it with others (e.g. other students, tutors and nurses), initiating social interaction with other students and/or with the contexts, which is part of the nature of ICT. Thus, it is important to understand how the process influences each individual and how the individual

constructs their knowledge after interacting with others in complex clinical environments. For this reason, social constructivism offered an effective theoretical lens through which the dynamics of learning with the use of ICT in clinical environments were explored.

3.3.2. Qualitative methodology: Constructivist Grounded Theory

GT is a popular methodology of qualitative research and it offers a chance for the construction of a theory via the inductive use of data from participants. GT is defined as the "*systematic, inductive, and comparative approach for conducting inquiry for the purpose of constructing theory*" (Bryant & Charmaz, 2007, p.1). Mills *et al*. (2006) also asserted that GT "*seeks to inductively distil issues of importance for specific groups of people, creating meaning about those issues through analysis and the modelling of theory*" (Mills *et al.*, 2006, p.8). However, before accepting these definitions, it is useful to know that fundamentally, GT offers guidelines for the construction of theories that are grounded in the collected qualitative data themselves, thus researchers who use GT start their research with the data (Charmaz, 2006).

As GT provides guidelines for constructing a theory, it would be worthwhile to examine what a theory is. Bacharach (1989, p. 496) defined a theory as "*a statement of relations among concepts within a set of boundary assumptions and constraints*". He continues that the main purpose of the theory is to understand certain phenomenon with the questions of '*why*', '*how*' and '*when*', rather than only describing the phenomenon with the questions of '*what*' (Bacharach, 1989). As the primary goal of

GT is to construct a theory, GT focuses on the questions of '*why*', although other qualitative research studies deal with the questions of 'how' and '*what*' (Charmaz, 2014). Thus, GT's characteristic of focusing on the questions of 'why' in theory construction corresponds to Bacharach's definition of theory (1989). Meanwhile, the theories constructed by GT can be divided into two theories: substantive and formal theories. The former deals with a specific phenomenon using theoretical interpretation or explanation. On the other hand, the latter deals with wider ranges of phenomena in a generic issue, and thus it is more abstract and general than the former. Additionally, formal theories can include substantive theories (Charmaz, 2006). Charmaz (2006, p. 129) asserted that the most of theories constructed by GT are substantive theories and thus the theories provide "*a guide to interpretive theoretical practice, not in providing a blueprint for theoretical practice*".

Although Glaser and Strauss had epistemologically different roots (i.e., Glaser was more oriented to positivism whereas Strauss was more oriented to pragmatism), they published a book 'The Discovery of Grounded Theory' together as a qualitative research methodology against the dominant research trend of quantitative research strategies (Glaser & Strauss, 1967). However, Charmaz (2006) argued that ironically, they were not completely free from the influence of the positivism paradigm and thus objectivism as ontology and the positivism as epistemology were both evidently reflected in the original GT. Moreover, they went on to develop GT in separate ways later on as Strauss wanted to reform the original GT toward more interpretive approach with Corbin. However, Glaser did not agree with many of their modifications of the original GT and stuck to his beliefs towards the original GT. As a result, Glaser and

Strauss now have different ontological and epistemological viewpoints of the proper procedures and methodological basis of GT (e.g. methods of selecting a research topic, interviews, literature reviews, and the analytic process) (Charmaz, 2006; Bryant & Charmaz, 2007; Morse *et al.*, 2009).

Many researchers including Glaser and Strauss have argued about the ontological and/or epistemological paradigms of GT (e.g., objectivism and interpretivism) since its beginnings. Now, social constructivism has been added to the argument as it has been receiving the spotlight from many researchers. GT within a constructivism paradigm is called CGT, which possesses different features from the Glaserian and Straussian GT. It can be called 'second generation GT' since the Glaser and Strauss theory is called 'first generation GT' (Charmaz, 2006; Morse *et al.*, 2009). Constructivists believe that individual experience and interaction with others are both vital in viewing reality and the knowledge building process. Therefore, the constructivist's goal in social science is to understand the meaning of reality held by participants due to their interpretation of the world around them (Guba & Lincoln, 1994; Schwandt, 1994). Charmaz (2006) is a key figure in CGT. She claimed that human beings' interpretive views (i.e., constructivist approaches) needed to be applied to GT in order to construct a theory because it makes the theory more coherent.

CGT is focused on "*how data, analysis, and methodological strategies become constructed, and takes into account the research contexts and researchers' positions, perspectives, priorities, and interactions*" (Bryant & Charmaz, 2007, p. 10). Moreover, Mills *et al*. (2006) believed that CGT, which is based on relativism as ontology and constructivism or subjectivism as epistemology, enables researchers to interactively

and reflectively restructure their relationships with their study participants during data collection and analysis (see Table 6). This is a different stance from the original GT that paid less attention to the interactive relationships (Glaser & Strauss, 1967; Charmaz, 2006). Thus, during the CGT research process, data are obtained via continuous mutual interaction between the researchers and their participants (Charmaz, 2006). Despite its popularity for data collection, interviews are "*not neutral, context-free tools for data collection"* (Mills *et al.*, 2006), therefore a researcher and a participant may or may not have the same position within an interactive relationship. In addition, the results of CGT-grounded research are achieved by the researchers' subjective interpretation of the participants' own reality (Charmaz, 2006).

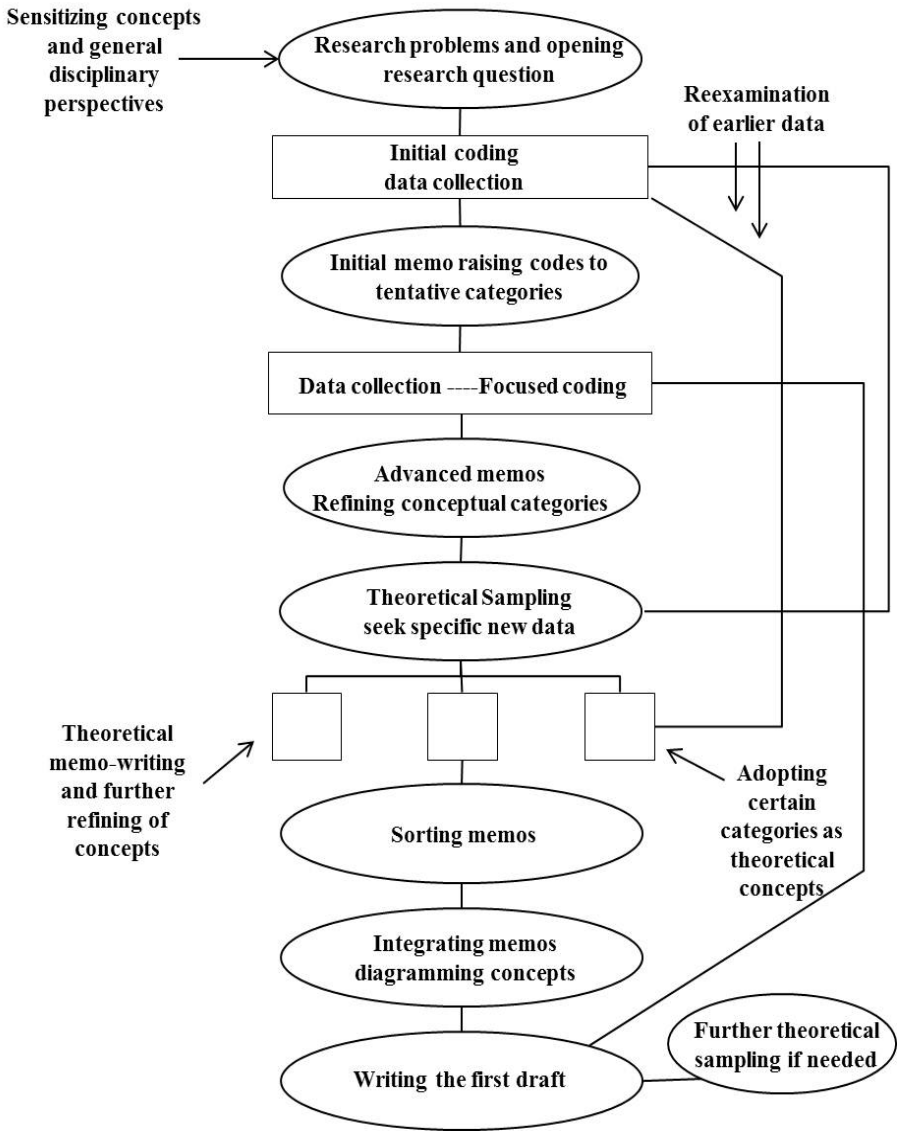
Table 6. Differences between CGT and first generation GT (Mills *et al*., 2006, p.9)

• *The creation of a sense of reciprocity between the participants and the researcher in the mutual construction of meaning and, ultimately, a theory that is grounded in the participants' and researcher's own experiences*
• *The establishment of relationships with participants which explicate power imbalances and attempts to modify these imbalances*
• *The clarification of the position in the text that the author takes, the relevance of biography and how one renders participants' stories into theory, through writing*

Based on the above background, Charmaz (2006) emphasised the need to maintain flexibility when using CGT. She reported the CGT process as a simple linear form starting with data collection and ending with writing the researcher's analysis and reflection on the whole process of the research. However, Charmaz (2006) also pointed out that the linear form cannot be suitable in real research processes. In practice, to

maintain flexibility during research, the researcher can stop the process and write whenever they have new ideas about the research topic, and during any stage of the research they can even go back to the field in order to obtain more in-depth data, all constructing a theory from the data (Charmaz, 2006). To illustrate this flexible and complicated process, Charmaz (2006) depicted the GT process as shown in Figure 3 below.

Figure 3. Charmaz's Grounded Theory process (Charmaz, 2006, p.11)



GT has been developed and modified by researchers' paradigms and positions (e.g. objectivist and constructivist) over the course of time. In other words, GT's utilisation and direction as a methodology are decided via researchers' individual ontology and epistemology (Annells, 1997). Thus, a researcher who adopts GT for a study should inform readers where he or she stands, providing an analytical lens to understand the research process and findings (Mills *et al.*, 2006). Furthermore, the researcher's reflexivity is one of the vital components in CGT, because researchers interact with participants and co-construct meanings in research (Charmaz, 1995, 2006; Mills *et al.*, 2008).

For this research, I utilise the theoretical lens of constructivism to study my subject (i.e. knowing individual experiences and social and cultural contexts are vital, because such knowledge defines a subjective reality). My reflexivity as a researcher is detailed later in this chapter (see *3.3.3. Reflexivity in this research*).

There were two additional reasons to adopt CGT in this research study:

1) CGT methodologies "*are suitable for studying individual processes, interpersonal relations and the reciprocal effects between individuals and larger social processes*" (Charmaz, 1995, p.28-29). As this research explored nursing students' individual experiences of using ICT within their social and cultural context as a means of discovering the dynamics of their knowledge building, CGT was suitable.

2) ConLT is strongly related to the subject of this research – learning process that includes the use of ICT (see *2.3.2. Relationship between ICT and the Constructivist Learning Theory*).

The concurrence of theoretical points of view from both the background and methodology parts of this research plan offered a strong possibility of consistent and rigorous findings. Therefore, CGT was the best methodology for this research.

3.3.2.1. My perspective in this research

As an editor of an international journal, Morse (2001) discovered that many researchers who conducted their research in various countries, used the GT methodology without describing the cultural aspects of their research, despite its vital role. After this discovery, she applied ethnographic strategies to her GT research. She was able to benefit from doing so, and subsequently recommended researchers to apply ethnographic strategies to GT studies (Morse, 2001). This supports the value of ethnographic strategies in GT research, which should not be ignored. Ethnographic strategies are used to achieve the aim of ethnography research, which deals with culture. Charmaz (2006, p.21) defines ethnography as "*recording the life of a particular group and thus entails sustained participation and observation in their milieu, community, or social world*". She also discussed the benefits of ethnographic strategies, which seeks multiple dimensions of participants' life, and argued that the methodological approach of GT can be reinforced by the ethnographic strategies, especially during data collection and coding (Charmaz, 2006). A thick description of a certain culture or social contexts via participant observation is a major technique used in ethnography. During observations, the researchers are required to consider their own positions. There are anthropological (or ethnographic) concepts of 'emic' and 'etic' originating from the concept of phonemic and phonetic respectively in

linguistics, and these terms would be useful to explain the researcher's position (Pike, 1967). The viewpoint of emic represents understanding of a distinctive culture or phenomena by insiders of that cultural group, whereas the etic viewpoint refers to outsiders' viewpoints of culture or phenomena (Spiers, 2000; Fetterman, 2008). In other words, emic is a researcher's perspective towards certain culture or phenomena as an insider. However, persons who do not share the same culture as those who are under study would not easily accept the emic perspective. Therefore, the researcher attempts to explain the culture or phenomena through the etic perspective by generalising the emic viewpoint (i.e., universal). Notwithstanding that emic and etic are less discussed in recent times than before, many ethnography research studies, and even other qualitative research studies, have implicitly adopted both concepts singly or in combination (Barnard & Spencer, 2009).

Despite the two perspectives remaining clearly distinguished from one another in a conceptual framework, the boundary between both concepts, in reality, is ambiguous. Olive (2014) argued that researchers cannot escape their own subjectivity from existing experience, theoretical lens and knowledge, when they deal with the emic viewpoint. Contrariwise, they can be in danger of ignoring genuine meanings that underlie participants' culture and social contexts, when they are only equipped with the *etic* viewpoints. Although the concepts of emic and etic have been criticised, they are still meaningful. Olive (2014) continued to argue that when researchers do not solely accept the separate meanings of the two views, but balance between the two perspectives and acknowledge the reflexivity, there would be better outcomes for qualitative research studies. For this balance, Patton (2015) suggested a strategy of

researchers inviting their participants to participate in their research as co-researchers. This participatory process would offer deep and situated descriptions of research questions by accepting the concepts of emic and etic, as well as reflexivity.

The ethnographic concepts of researchers' positions described above (emic and etic) with the reflexivity in cultural research resembles the researchers' positions in CGT research. As discussed above, CGT acknowledges the importance of social and cultural contexts, and researchers using CGT are encouraged to actively interact with their participants and reflect on their research ideas within those contexts. Moreover, they believe the results of their research are co-constructed with the participants. Thus, I utilised the perspectives of both emic and etic with my reflexivity for this research as this research involved Korean participants and so inevitably explored the cultural aspects of Korea. The combination of CGT methodology and ethnographic strategies in this research was expected to increase the rigour of this research by enhancing my cultural sensitivity. As I am a Korean myself, having been born and raised in Seoul, I share the same Korean culture with the participants who actively participated in this research, and also share similar experiences of nursing education. Hence, I was able to take on the emic perspective as an insider. Additionally, having lived in the UK for over five years, I was also able to take on the etic viewpoint by comparing and reflecting on my experiences in the UK, therefore identifying the uniqueness of nursing education within the context of Korean culture. Consequently, I was able to have deeper and richer understanding of the Korean participants by taking on both emic and etic positions, and was equipped with better reflexivity than other researchers who do not have both experiences in Korea and in the UK. The next section will further

detail my background and reflexivity during the research.

3.3.3. Reflexivity in this research

Charmaz (2006) asserted that constructivism encourages researchers to be reflexive in their interpretations on the research topic. Moreover, as researchers inform of their reflexivity in their CGT studies, the readers are able to "*assess how and to what extent the researchers' interests, positions, and assumptions influenced inquiry*" (Charmaz, 2006, p. 188).

In the above sections I discussed that reflexivity played a vital role in collecting data, including memoing and interpretation of the data. To understand the reflexivity of a researcher it is necessary to have some understanding of their perspective, and therefore in the following section I have detailed some of the key influences on my thinking.

- My nursing education and practice as a nurse

I graduated from primary and secondary school in Seoul, Korea. I did my best to attend and study as my peers did in order to gain admittance to a good university – an ideal educational goal that is reinforced strongly in Korea. During those schooling years, teachers gave us lectures that we passively listened to, like sponges absorbing the lecture contents. We were rarely given time for discussion during classes, but even then, most of my peers did not engage in the discussions. Moreover, the majority did not ask questions and remained passive. After taking the competitive College Scholastic Ability Test, I entered a nursing school (university) in Seoul. During my 1st

and 2nd year, I mostly attended lectures in the school as I did for primary and secondary school. From my 3rd year, I started clinical placements in various hospitals and public health centres, along with attending lectures at university. I recall that in my past placements, I was enthusiastic to learn in the clinical environments and I was excited whenever I was able to conduct nursing practice in real clinical situations. However, it was difficult to learn as much as I wanted because the nurses had little time to educate me in the busy clinical environments. As I did for lectures, I adopted passive roles by following the nurses' orders. When I completed the nursing school curricula, I took the National Council Licensure Examination for nursing registration in Korea and passed. After that, I worked as a nurse in a tertiary hospital in the city for five years. While I was working, it was challenging to complete my work during the given time due to the high patient load and their high levels of dependency. I was solely responsible for as few as five patients and as many as 20 patients, but on average, I cared for approximately 12 patients during each shift. Accordingly, I frequently stayed beyond my working hours. On top of my duties, I also had the experience of supervising and educating nursing students, but I was unable to educate them properly due to the heavy workloads. After approximately five years working as a staff nurse, I resigned from the hospital for my higher education. Since 2010, I have been studying at the University of Edinburgh for my MSc and am now pursuing my PhD.

- My experience of ICT

In terms of ICT, I received computer education at a private computer training institute for five years during the late 1980s, when computers were beginning to be widely disseminated in Korea. Although the ICT knowledge I obtained by attending the

computer institute is no longer useful at present due to the fast change of pace in the field, I am still very interested in ICT devices and use them without any fear due to my childhood educational experience.

When I was a 1st year nursing student, I took a general computer utilisation course (e.g., using a word processing program, the PowerPoint and the internet) in 1999 as a liberal art course. I enjoyed this course, but the course was too easy for me as I already had sufficient knowledge to use those programmes.

After graduating from university, I was trained in ICT at the hospital I worked in, which was one of the most advanced ICT hospitals in Korea. Every part of the hospital was digitalised, so that the hospital could offer the best care effectively, rapidly, and safely. For this reason, ICT educational programs were essential training for hospital staff members. Although I took the computer utilisation course in my university, I did not learn how to use healthcare ICT at university but instead, at the hospital when I became a staff nurse.

While working in the hospital as a staff nurse, I was chosen as the only healthcare professional to be a member of a task force team that was formed to update the hospital's ICT platforms. I performed several tasks, such as coding healthcare information, reorganising the healthcare database, and explaining hospital healthcare information to other members of the team. During this experience, I realised again I had great interest in technology and enjoyed working with the technology.

In retrospect, much of my knowledge of nursing and ICT have been built and added to by my life experience, over time and by experiencing different social contexts,

although I acknowledge that I also accumulated some of my knowledge passively through the standardised school education. Through this reflection, I discovered that there is no fixed knowledge, and that both personal experience and social context have had great effects on my knowledge building, which is aligned with the constructivists' beliefs.

I did not have great 'academic' interest in ICT applied to the nursing field when I was a student and nurse in Korea, because I accepted the ICT as a matter of course with other critical thinking tools. However, based on my experiences and my epistemology (constructivism), my interest in ICT grew while taking the E-portfolio and Personal and Professional Development (PPD) course during my MSc course and while writing my MSc thesis (Title: Paradigms and research on mobile learning in nursing education).

During those academic experiences, I was able to look back on my experience and review how ICT was utilised in nursing fields. I realised that nursing professionals as well as students were not adequately competent in using ICT. Moreover, from my literature reviews, I discovered that there is very little research on the use of ICT for knowledge building in nursing despite its use and significance in the profession and its education. I also found that most of the existing research focused on the engineering aspects and effectiveness of ICT devices, rather than focusing on its human aspects. For this reason, I decided to investigate nursing students' attitudes toward ICT, and to explore the human aspects of using ICT for knowledge building.

With my abovementioned background, I conducted this research by reflecting on my experiences during participant interviews, memo writing, and data analysis. Thus, I acknowledge that the findings from this research came from collaborating with the

participants as well as reflecting on my experience and accepting the participants' experiences.

3.3.4. Qualitative data collection

3.3.4.1. Sampling

This research also recruited nursing students during qualitative research. The inclusion and exclusion criteria of nursing student participants were the same as that of the quantitative research (see *3.2.3.2. Participants of quantitative research*).

Assuming that participants who indicated in the surveys their intention to participate in further interviews for the qualitative research portion of this study would have more interest and enthusiasm than others, I initially contacted the fifteen participants (i.e., nursing students) via email. Of those, ten nursing students replied and confirmed their participation. Four nursing students of the confirmed ten took part in the initial individual interviews. The remaining six nursing students expressed wishes to participate in interviews as a group, one of four students, and another of two students. Therefore, this research conducted four individual interviews and two group interviews for the first round of interviews (see Table 7).

The group interviews can be described as 'focus group interviews', but it would be better to describe them as 'group interviews'. This is because this research did not follow the formal principles of focus group interviews, such as mixed group composition and three to fourteen participants in each group (Gill *et al.*, 2008). Rather, I simply accepted the participants' requests to be interviewed with peers. Through

these group interviews, I expected the participants to feel comfortable as they were with peers, and through our interactions, the interviewees and I would be able to co-construct meanings to understand their nursing education experience from diverse viewpoints.

All interview participants were female nursing students currently in the early stages of their fourth year (academic years in Korea begin in March, compared to UK academic years, which start in September) at three universities that offer bachelor's degree courses in Seoul, Korea. The age range of the participants was from 20 to 23 years. The first interviews were conducted between 2nd April and 15th April 2013 in Seoul.

Table 7. First interview: Nursing students

Interview	Name*	University	Gender	Age	Grade	Place
Individual Interview	Dahee	A	Female	23	4	University
	Wanki	A	Female	20	4	University
	Sarang	B	Female	21	4	University
	Yoonjin	C	Female	20	4	University
Group 1 Interview	Ari	C	Female	21	4	University
	Eunju	C	Female	20	4	
	Garam	C	Female	21	4	
	Hyemin	C	Female	20	4	
Group 2 Interviews	Bora	C	Female	20	4	Hospital
	Sori	C	Female	20	4	

Note. * = All participants' names were changed to pseudonym Korean names for their confidentiality. The reason for using Korean names is to enhance the vividness of the Korean context for readers; Place refers to the location where the interview took place.

One week before the first interviews, the participants were briefly informed of the interview questions via email in order to give them time to reflect on their experience in relation to the interview topic and to encourage more reflective and analytical answers.

After these first interviews, further rounds of interviews (i.e. second, third and fourth interviews) were conducted with some of the existing participants and with new participants using a theoretical sampling method, until theoretical saturation of findings was achieved. Theoretical sampling is a process of collecting more data by focusing on the emerging categories and accompanied information of the categories. As a result of the sampling, the categories will become more refined and detailed (Charmaz, 2006). This process of sampling needs to be conducted until no new information of the categories and its properties is discovered by researchers (and/or participants) and it means that the categories are saturated (Charmaz, 2006). I made decisions on the theoretical sampling process for this research, and thus my analytical interpretation of the collected data from the first interviews played a vital role in the sampling. The theoretical sampling method in the second, third and fourth interviews, as well as the participants' information, is detailed in the later sections (see *3.3.7.2. Stage II: Second interviews* to *3.3.7.4. Stage IV: Verification of theoretical saturation*).

Memo writing was useful for both analytical interpretation and theoretical sampling as it guided me in deciding on what further data were required, and who the appropriate participants for obtaining that data were (see *3.3.6 Memoing*).

3.3.4.2. Qualitative research method: Intensive interviewing

Interviews are a popular and a suitable method of data collection because they correspond to the purpose of qualitative research, especially in GT research (Schreiber & Stern, 2001; Parahoo, 2006; Creswell, 2007). Interviews in qualitative research

consist of open-ended questions, which are prearranged, and new spontaneous questions, which are developed by the researcher during the interviews (DiCicco-Bloom & Crabtree, 2006). The interview plays an important role in the interaction between the participants and the researcher as they reflect their experience during interviews and allow co-construction of meaning (Charmaz, 2006; Mills *et al.*, 2006). Furthermore, the meanings have to be discovered within the social contexts of which they occur (Mishler, 1979).

This research particularly used an intensive interviewing method as Charmaz (2006) asserted that this method is suitable for GT research. An intensive interview means "*a directed conversation that elicits inner views of respondents' lives as they portray their worlds, experiences, and observations*" (Charmaz, 1991, p.385). The essential purpose of intensive interviewing is to elicit the interviewees' subjective world and interpretation of their experience. This allows information regarding a certain topic to be obtained, alongside the interviewees' experiences of it, and their reflections on those experiences (Charmaz, 1991; Charmaz, 2006). Meanwhile, the in-depth interview method is different from the intensive interview in GT research. This is because the intensive interview tapers the scope of interview topics by focusing on constructing a theoretical framework (Charmaz, 2006). Therefore, this research adopted the intensive interview method to achieve the research aim and objectives of this research (i.e., constructing a theory).

For a guide to the interview method, it is useful to check the interview principles suggested by Charmaz (2006), p.30:

- *Participants' comfort level has higher priority than obtaining juicy data;*

- *Researchers pay close attention as to when to probe;*
- *Researchers try to understand the experience from the participant's view and to validate its significance to this person;*
- *Researchers slant ending questions toward positive responses to bring the interview to closure at a positive level.*

I tried to abide by the four principles as below:

1) I recommended for the participants to choose a place within their own grounds and attempted to construct rapport with them for their comfort. In particular, in consideration of the gender difference between myself and the interviewees, and preservation of the nursing education contexts, calm and secure public places in a university or hospital, such as a lecture room or a common room, were recommended.

2) With a high theoretical sensitivity, I paid close attention to finding opportunities to ask further in-depth questions. For example, when I realised that nursing students' emotional burdens during clinical placements were a critical factor to their learning, I immediately asked more questions about their emotions and encouraged them to talk more about it.

3) I tried to maintain the mental attitude of 'learning from participants'

4) I ended the interviews by asking positive questions (see Appendix 4)

The interviews took between one and two hours to complete and all the interviews were recorded by a portable voice recorder. During and after interviews, I wrote memos as reflecting my ideas regarding the participants' answers.

3.3.5. Qualitative data analysis

The first analytic process in GT is the coding of data (Charmaz, 2006). Charmaz (2006, p.43) instructed that coding *"is the first step in moving beyond concrete statements in the data to making analytic interpretations*" and she likens coding to the bones of a skeleton.

In accordance with the CGT process, there are primarily two stages of coding for analysis – initial coding and focused coding. In the initial coding stage, data are coded word-by-word, line-by-line, incident to incident and in-vivo. The goal of the initial coding process is to abbreviate collected data (i.e. naming process) as codes, which represent the main characteristics of the data. I mainly utilised line-by-line and in-vivo coding methods. Line-by-line coding is one of popular coding methods in GT research and involves naming of each line of transcribed data (Glaser, 1978). Through this coding method, researchers can gain new perspectives towards the data and reduce the chances of unquestioningly applying their preconceived ideas to the data. Moreover, the method enables the researchers to easily compare between codes and supports categorisation of the codes (Charmaz, 2006). The in-vivo codes is a coding method that uses participants' own words for generating codes (Chesler, 1987). Researchers can preserve meanings of words as told by participants and gain chances to understand the participants' meanings and actions that underlies the words (Charmaz, 2006). In order to identify fitness and relevance to GT, the initial codes should "*remain open, stay close to the data, keep the code simple and precise, construct short codes, preserve actions, compare data with data and move quickly through the data*" in this process (Charmaz, 2006, p.49). In order to preserve the actions and stay close to the data, this

research attempted to generate initial codes with gerund forms as it presents continuity and retains fluidity of the meanings discovered (Charmaz, 2006).

The next stage of coding is called focused coding, and refers to "*using the most significant and/or frequent earlier codes* (i.e. above initial codes) *to sift through large amounts of data. Focused coding requires decisions about which initial codes make the most analytic sense to categorise your data incisively and completely*" (Charmaz, 2006, p.57). Thus, focused coding is the process for finding and developing core categories within the research results and enables the researcher (and participants) to construct a theory.

After completing the abovementioned two coding methods, a theoretical coding method can be adopted as a last step of qualitative data coding. Theoretical coding means "*a sophisticated level of coding that follows the codes you have selected during focused coding… theoretical codes specify possible relationships between categories you have developed in your focused coding*" (Charmaz, 2006, p.63). Based on focused codes, this research attempted to develop theoretical codes to integrate meanings discovered during this research and to identify the relationships between those meanings.

In GT, codes emerge by giving a researcher's definition of data as the researcher interprets the data. Through active coding of the data, I was able to repeatedly interact with the data, which guided me to find new and unpredicted areas within my research topic and come up with new questions (Charmaz, 2006). Although the codes generated are due to my interpretation (i.e., researcher's perspective), I tried to stand with the participants' viewpoints by interacting with them, trying to understand their

behaviours (i.e., interpretive rendering) (Charmaz, 2006).

During the coding stages, constant comparison plays a critical role in the analysis. The role of constant comparison activities is to assist the development of a theory by identifying the concomitant features of the data, codes and categories (Glaser & Strauss, 1967; Charmaz, 2006). It also offers consistency and creativity for theory development and is continued until theoretical saturation. Glaser and Strauss (1967, p105) suggested a process for the constant comparison method in four stages: "*1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the theory and 4) writing the theory*". In addition, this method can be used to verify that the developed theory is indeed the best test tool.

This research study utilised a qualitative data analysing software, Nvivo 10. Nvivo is a software programme used to support elaborate data coding and the development of theories (Ozkan, 2004). Ozkan (2004) believed that Nvivo enables researchers to manage coding easily, thus it facilitates constant comparisons, and reveals relationships between the codes and data. Moreover, the software can integrate diverse data sources such as memos and interviews, and can reduce research time and expended funds by supporting the rapid analysis of collected data. Nvivo is useful for CGT research because it enables the research results to reflect contexts and the researchers' voice, plus it increases the rigour of the research (Ozkan, 2004). To use Nvivo proficiently, I took two Nvivo 10 workshops provided by QSR international, in both Seoul, Korea, and Edinburgh, the UK.

3.3.6. Memoing

Writing memos is a major part of the GT research method because it provides a continuous recording of the researcher's ideas and questions that have been generated through data collection and analysis, both inductively and deductively (Schreiber & Stern, 2001; McCann & Clark, 2003). Particularly with CGT, memo writing is vital. This is because the emphasis of CGT is on the researcher's reflexivity, including the researcher's history, beliefs, and thinking. As memo writing is a reflective procedure, the researcher has the opportunity to "*remember, question, analyse and make meaning about the time spent with participants and the data that were generated together*" (Mills *et al.*, 2006, p.11).

Memo writing begins at the planning stage of research (Schreiber & Stern, 2001), although other researchers such as Corbin and Strauss (1990) and Charmaz (2006) claim it starts at the analysing stage. Either way, memo writing should continue until the very end of the study (Corbin & Strauss, 1990). The process of memo writing should not be interrupted by specific formats and lengths, and it will be classified and reclassified during the writing stage of the research (Schreiber & Stern, 2001). Charmaz (2006) also advised that researchers are encouraged to immediately write memos whenever their ideas of research topics arise as this immediate memoing process enables preservation and development of their natural voices of the topics.

Memoing during the analysis phase of research more specifically facilitates researchers' return to the data for constant comparisons and enables them to stay close to the data (Charmaz, 2006). In addition, the researchers can notice weak relationships or gaps between research findings via memoing (Charmaz, 2006), and thus be required

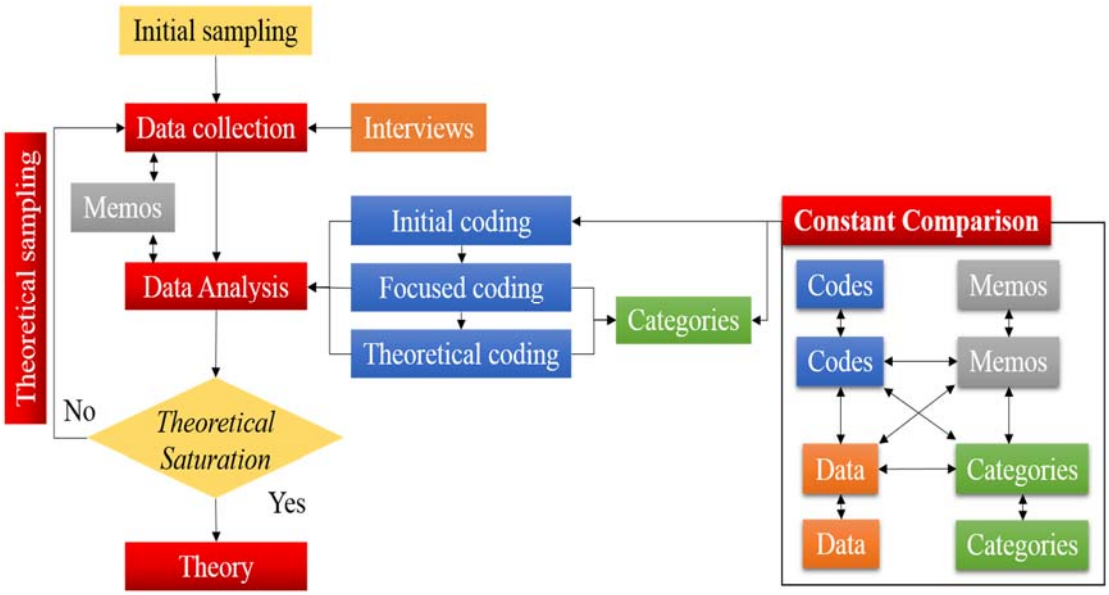
to obtain more data from existing participants and/or new participants for theoretical saturation of the categories and its properties. Therefore, memoing is closely connected with theoretical sampling.

A sample of my memoing is available in Appendix 7.

3.3.7. Use of Constructivist Grounded Theory methodology for this study

Based on the above rationales for the chosen research methodology of CGT, I repeatedly collected and analysed data. The methodological pathway of this research is briefly schematised (see Figure 4).

Figure 4. Methodological pathway of this research



3.3.7.1. Stage I: First interviews

For the first interviews, open-ended and non-judgemental interview questions on the two major topics (Learning during clinical placements and using ICT) were developed according to Charmaz's (2006) recommendation. For the intensive interview method in GT research, Charmaz (2006) recommended designing broad and open-ended questions firstly, and then narrowing down the questions to focus on detailed topics (see Appendix 4: First interview questions). After developing the initial questions, two senior researchers who are qualitative research professionals in nursing studies reviewed the questions and gave me feedback. I then accordingly modified the questions. The quantitative portion of this study was also utilised to develop the questions. For example, when I reviewed the collected questionnaires of the quantitative research portion, I found that some of the nursing students commented on their difficulties in using ICT during clinical placements. Therefore, I decided to ask about the clinical contexts in which they use ICT during placements, and made this open-ended and non-judgemental question, "*How do nursing students use ICT in the clinical contexts?*" As such, I could get some sense from the questionnaires what I needed to ask during the interviews. Moreover, I could save time and money, whilst conducting intensive in-depth interviews. For these first interviews, the interview questions were prepared beforehand as well as were created during the interviews by responding to unpredictable answers from participants.

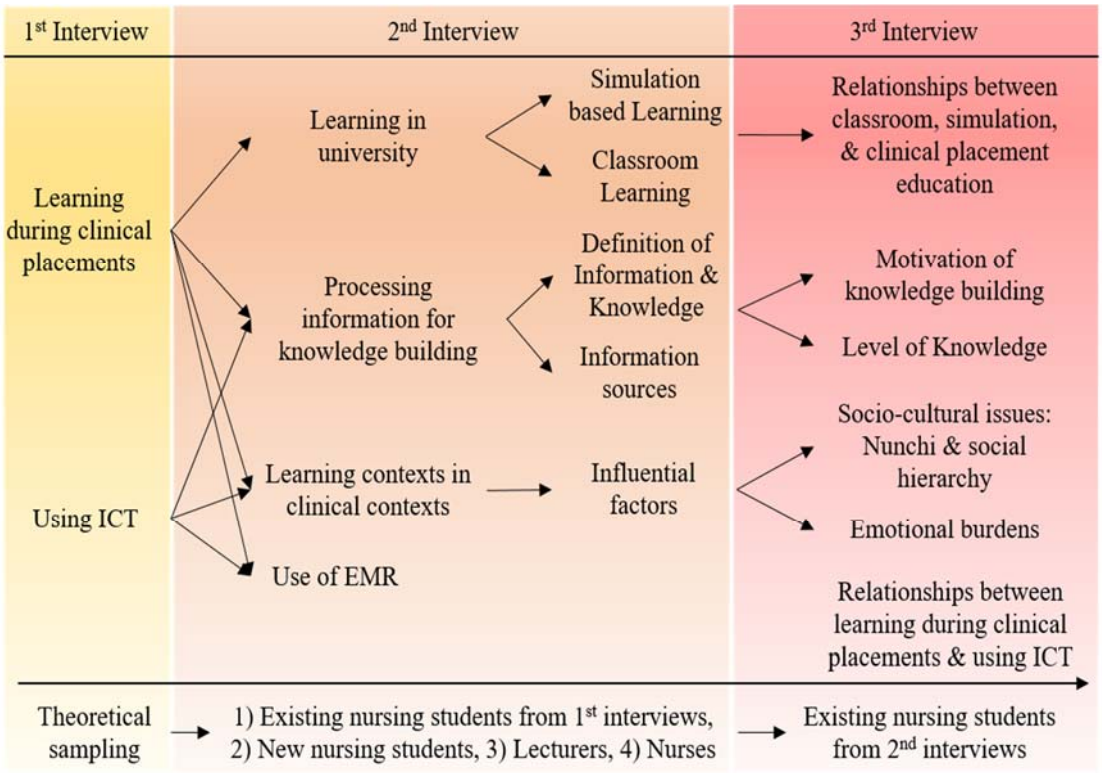
- **Analysis**

After the first interviews, analysing processes were conducted. The recorded interviews and written memos from the interviews were reviewed more than two times.

Then, other memos were written based on the reviews. From these, I generated provisional codes and prioritised memo writing during the reviews at this stage.

Through this process, I identified other topics that required further exploration in order to understand the students' learning and use of ICT during clinical placements (i.e., topics of first interview). The topics were 1) learning in university, 2) processing information for knowledge building, 3) learning contexts in clinical environments and 4) using EMR. The topic of 'learning in university' was further extended to 'classroom learning' and 'SBL'. 'Processing information for knowledge building' was extended to 'definition of information and knowledge' and 'information sources'. Furthermore, influential factors, particularly socio-cultural aspects, were explored as a subtopic of 'learning contexts in clinical environments' (see Figure 5).

Figure 5. Expansion of interview topics and theoretical samplings



Based on these identified topics, second interview questions and theoretical sampling were prepared. Due to the need to explore SBL and classroom learning, a plan to recruit university lecturers as participants of this research was established. Moreover, it was identified during the first interviews that contextual factors of the clinical environments influenced the nursing students' learning, particularly the socio-cultural aspects (e.g., social hierarchy). Thus, I prepared to recruit nurse participants for a deeper understanding of the clinical environments and nursing students' learning. Nursing students from a different university (i.e., 'D' university) also needed to be recruited, because interviewees of the first interviews mentioned differences in their EMR use to that of the nursing students of 'D' university. Thus, I contacted nursing students of 'D' university to request for their participation to gain a wider understanding of EMR use in Seoul, Korea.

3.3.7.2. Stage II: Second interviews

In CGT, researchers should not passively read collected data, but rather, they should act on the data (Charmaz, 2006).

The second interview questions were generated based on the identified topics from the data of the first interviews (see Appendix 5: Second interview questions for nursing students, nurses and university lecturers). The second round of intensive interviews were conducted between 21st May and 16th June 2013.

- **Theoretical sampling**

All the student interviewees, including those who participated in group interviews in

stage one were invited to the second round of interviews. All of them agreed, expressing their interests in this research. These second interviews were expected to verify my interpretations regarding the first interviews with the existing participants, and thus I was able to bridge the gaps between my perspective and the interviewees' perspectives of the interpretations. In addition, I expected to be able to explore their experience more deeply with the newly identified topics.

Four new nursing students joined as additional participants to this research. During the interviews with the four new participants, I attempted to confirm whether the new participants had similar experiences to the first interviewees, and to explore new perspectives with them. Particularly, three of the four nursing students were from 'D' university and were invited to this research due to the theoretical sampling discussed earlier. For this second round of interviews, eight individual and two group interviews were conducted. The new interviewees were also fourth year nursing students and their ages ranged from 21 to 23 (see Table 8).

Table 8. Second interview: Nursing students

Interview	Name	University	Gender	Age	Grade	Note
Individual Interview	Dahee	A	Female	24	4	
	Wanki	A	Female	21	4	
	Sarang	B	Female	22	4	
	Yoonjin	C	Female	21	4	
	Hwashin	D	Female	21	4	*
	Kuntaek	A	Male	23	4	*
	Miran	D	Female	21	4	*
	Sua	D	Female	21	4	*
Group 1 Interview	Ari	C	Female	22	4	
	Eunju	C	Female	21	4	
	Garam	C	Female	22	4	
	Hyemin	C	Female	21	4	
Group 2 Interview	Bora	C	Female	21	4	
	Sori	C	Female	21	4	

Note: * = Newly added participants.

I also interviewed four nurses and two university lecturers as theoretical sampling, as shown in Table 9 and Table 10 respectively. I aimed to recruit nurses and university lecturers with various ranges of work experience, because they could have different viewpoints of the topics due to individual work experiences.

Table 9. Second interview: Nurses

Interview	Name	Hospital	Gender	Age	Working years	Note
Individual Interview	Nayoon	E	Female	35	12	*
	Hansol	F	Female	33	9	*
	Sukjin	F	Female	30	4	*
	Sunja	F	Female	50	24	*

Note: * = Newly added participants.

Table 10. Second interview: University lecturers

Interview	Name	University	Gender	Age	Working Years	Note
Individual Interview	Hyori	C	Female	33	3	*
	Jongwon	A	Male	53	19	*

Note: * = Newly added participants.

In order to recruit nurses, I contacted a tertiary hospital in Seoul, Korea, that accepted nursing students from various nursing schools for their clinical placements. The hospital introduced four nurses who volunteered to participate in this research. All the nurses had sufficient experience to train nursing students. Similarly, I contacted two lecturers from ‘A’ and ‘C’ universities for the second round of intensive interviews. Both lecturers' contact details were provided through academic acquaintances, and both consented to their participation in this research. Both had rich experiences in running classroom, clinical placement, and SBL. By recruiting the two professional groups, multidimensional perspectives towards nursing students’ learning and nursing education could be explored. Memos were also written during the interviews with the professionals.

- **Analysis**

After collecting the second interview data, all of the initial and second interviews were transcribed as written form in Korean. Then, initial and focused coding of both initial and second interviews were formally conducted using Nvivo 10. As a first step of coding, I conducted line-by-line and in-vivo coding of the first interview scripts, and then focused coding was performed, generating conjectural categories based on the initial codes. Throughout this process of coding the second interviews, memos written during the first and second interviews were utilised and I began writing new memos during this analysis process.

Initial and focused codes of the second interview scripts were also generated, followed by the first interview coding. During this second interview coding, all the data, initial codes, focused codes and existing memos were continuously compared with the

second interview data. Through this comparison, the codes and conjectural categories from the first interview analysis were modified, elaborated and sophisticated, and new codes and categories were also created. An example of initial and focused coding is shown in Appendix 8.

During analysis of the first and second interviews, memoing played a vital role in the organisation of and reflection on my ideas, as well as in increasing my theoretical sensitivity of the research topics (see Appendix 7). Furthermore, the use of Nvivo 10 allowed me to systematically generate and to easily compare codes and categories.

Likewise to the second interview questions, the third interview questions were developed based on the above analysis of both the first and second interviews, and corresponding memos. The third interview questions dealt with six topics: 1) 'relationships between classroom, simulation, and clinical placement education', developed from the second interview topic of 'learning in university', 2) 'Motivation of knowledge building' and 3) 'Level of Knowledge', extended from 'processing information for knowledge building' in the second interview, 4) 'socio-cultural issues: nunchi & social hierarchy' and 5) 'emotional burdens', expanded from the second interview topic of 'learning contexts in clinical environment', and 6) 'relationships between learning during clinical placements and using ICT'. The sixth and final group of questions were formulated to relate back to the broader first interview topics (i.e., 'learning during clinical placements' with 'using ICT'), and were based on my deeper understanding of the research question from the first and second interview analysis (see Figure 5).

Meanwhile, after the coding, the coding methods were explained to the supervisors

using these second interview transcripts and were subsequently agreed upon to verify the coding methods used.

3.3.7.3. Stage III: Third interviews

The aims of the third intensive interviews were to 1) have a deeper understanding of the interviewees' learning, 2) to verify the findings from the first and second interviews with the interviewees, and 3) to consolidate the relationships between discovered categories from the focused coding process for theoretical coding. The third interviews were conducted using the developed interview questions (see Appendix 6: Third interview questions for nursing students) between 10th October and 20th October 2013.

- **Theoretical sampling and data collection**

To meet the above aims, I invited the existing three interviewees for individual interviews and one group interview consisting of four nursing students and they all accepted to be interviewed (see Table 11). The reason for inviting them to this round of interviews was to explore six newly discovered topics from stage two (i.e., theoretical sampling).

Table 11. Third interview: Nursing students

Interview	Name	University	Gender	Age	Grade
Individual Interview	Hwashin	D	Female	21	4
	Miran	D	Female	21	4
	Yoonjin	C	Female	21	4
Group 1 Interview	Ari	C	Female	22	4
	Eunju	C	Female	21	4
	Garam	C	Female	22	4
	Hyemin	C	Female	21	4

- **Analysis**

The third interviews were transcribed in Korean and then underwent line-by-line and focused coding using Nvivo 10 through comparison with former interview data, existing codes and memos. As a result of this process, I categorised all focused codes into six main domains of learning dynamics as theoretical coding: 1) knowledge building process, 2) learning during clinical placement education, 3) learning during SBL, 4) learning during classroom education, 5) relationships between simulation, classroom and placement education, and 6) learning with ICT. The first domain will be discussed in Chapter Four and the second to fifth domains will be demonstrated in Chapter Five. The domain 'learning with ICT' will be finally addressed in Chapter Six.

Theoretical coding was conducted *between* the domains. Based on the understanding of the nursing students' cognitive knowledge building process (i.e., the first domain), the three main types of the nursing students' education (i.e., the second to forth domains) and its mutual relationships (i.e., the fifth domain) were explored. Grounded in these five domains, nursing students' use of ICT for their nursing education was explained. The theoretical coding is also conducted *within* each domain. I constructed a sequence of presenting the research findings, starting from 1) the contextual backgrounds, then 2) the participants' responses to the backgrounds, to 3) the results of both the background and responses, so as to identify relationships between the focused codes (inspired from axial coding).

For example of the learning during clinical placement education (i.e., the second domain), the six influential factors on nursing students' learning during clinical placements (i.e., focused codes) were grouped into the contextual backgrounds and

their responses of the factors for their learning, such as using the nunchi mechanism, were identified as the second sequence. Finally, the results of their learning during the placements from the six factors and their responses were demonstrated in the last sequence (see Figure 6).

Figure 6. An example of focused and theoretical codes of this research using Nvivo 10

Throughout the above theoretical rendering processes (the term of theoretical rendering is referred to as interpretive rendering with theoretical sensitivity in this research), I was able to discover the relationships between focused coding (i.e.,

theoretical coding) and to construct more elaborate and sophisticated conceptual frameworks.

Meanwhile, after completing the second intensive interviews (i.e., *3.3.7.2. Stage II: Second interviews*), I constructed process models (see Chapters Four and Five), based on the findings from stage two. During interviews in stage three, I shared the models with the interviewees who were recruited for this third interviews using handouts, and then received their confirmation on whether the models were acceptable to them, as well as additional information to supplement explanation of the models (e.g., giving more examples regarding their experience of knowledge building process). By this process, I could invite the participants of this research to the analysis process of this research, and thus, the participants and I were able to co-construct the research findings.

3.3.7.4. Stage IV: Verification of theoretical saturation

The major purpose of this stage was to verify theoretical saturation of research findings, especially theoretical and focused codes, by theoretical rendering.

- **Theoretical sampling**

As the last step of data collection and analysis, two existing interviewees for individual interviews and two new nursing students as a group interview were recruited. Their demographic details are available in Table 12. The reason to recruit the new students was to verify the research findings of this research through new perspectives. Interview questions were not prepared, but I freely introduced the research findings with them and asked for their feedback.

Table 12. Fourth interview: Nursing students

Interview	Name	University	Gender	Age	Grade	Note
Individual	Dahee	A	Female	24	4	
Interview	Yoonjin	C	Female	21	4	
Group 3	Gayoung	A	Female	21	4	*
Interview	Junho	A	Male	27	4	*

Note: * = Newly added participants.

The individual interviews were conducted between 16th September and 18th September 2014 and the group interview with the two new participants was performed on 24th June 2015.

- **Analysis**

As a consequence, all the participants of these fourth interviews not only agreed with the findings, but also gave me their relevant experience of the findings. I considered the comments by comparing it with all existing data, including both interviews and memos. Finally, I confirmed the theoretical saturation of all findings, including the conceptual models, after the theoretical rendering. The findings will be introduced in following chapters.

During the interval between the fourth individual interviews and Group 3 interview, my research supervisors and I critically reviewed all the processes and findings of this research, and then proposed a final version of the findings. With the final version, I interviewed the participants in Group 3 in order to check interoperability of the final version with the new students (i.e., this process was an effort to examine a possibility to be a formal theory).

3.3.8. Translation issues

Qualitative research mainly involves the use of words and its meanings. Thus, researchers are required to deal carefully with language used in qualitative research due to the underlying meanings that is embedded in different languages (van Nes *et al.*, 2010). Therefore, the issues with translation need to be addressed in cultural research in order to properly understand cultural complexities (Simon, 1996). The translation cannot be conducted in a neutral or objective position, rather, it contains the translator's interpretation (i.e., subjectivity), and thus the translator's epistemology plays an important role in the translation (Temple & Young, 2004; van Nes *et al.*, 2010).

Based on the above rationale, this research carefully designed a translation plan of the interview transcripts from Korean to English in order to preserve the meanings in the transcripts. I conducted coding in English and translated the interviewees' quotations, to English. After that, I invited one of the interviewees of this research (Junho) into this translation process in order to collaborate and find appropriate English words to depict the subtle meanings of Korean words (i.e., accepting constructivist's methodological and epistemological paradigm). Junho is a fourth year nursing student at a university in Seoul, and is bilingual in English and Korean (more details of his English qualification is available in Table 13). Although co-constructed meanings with Junho in the translation process do not represent all of the other participants' meanings, it was expected that as an insider to nursing education, Junho had a wider ability to understand the subtle meanings of words used in the interviews, as compared to professional translators who lacked a proper understanding of the nursing field (an outsider). Moreover, a medical student in the UK who is also bilingual in English and

Korean was invited to review the translations. The reason for inviting the medical student, who has a deeper understanding of clinical environments, was to verify the translation by defining the semantic meaning of the words. When the two translators and I encountered Korean words that would lose their subtle meanings when translated to English, they decided to use the Korean words, in its romanised form (e.g., *nunchi, gab and eul*), in the translation and codes (i.e., in-vivo coding). When the translation process ended, the back-translations of several paragraphs (randomly chosen) were conducted to verify the translation by inviting three bilingual Koreans based in the UK (i.e., two nurses and one PhD candidate in Social Sciences, see Table 13) to translate those paragraphs back into Korean. These translation and back-translation processes were continued until all came to agreement on the translations.

Table 13. Translators' English qualifications

Name	Position	English qualification	Note
Junho	Nursing student (BSc) in Korea	TOEIC 955 TOEIC Speaking 180 TOEIC Writing 190	Lived in the USA for 8 years Translator experience
Jihyun	Nursing student (MSc) in the UK, Nurse	IELTS academic: overall score 6.5	5 year work experience
Gain	Nurse in Korea and the UK	IELTS academic: overall score 8	8 year work experience Translator experience
Sunmi	Medical student (MBChB) in the UK	IELTS academic: overall score 8.5	Interpreter experience
Migu	PhD candidate in Social Sciences in the UK	TOEFL score 109	Lived in the UK for 5 years

Throughout both translation processes, I aimed to guarantee the believability, legitimacy and readability of the translation in this cultural study. Moreover, I also

aimed to ensure rigour of this qualitative research via these processes.

3.3.9. Conducting the literature review under the Grounded Theory approach

There are many critical discussions of the timing of literature reviews between GT methodologists. Glaser and Strauss (1967) encouraged researchers to postpone their literature reviews until analysis is completed in order to prevent the researchers' preconceived ideas from influencing their work, and to preserve the purity of their findings from the literature reviews. However, Charmaz (2006) contended that their stance towards existing knowledge from literature reviews is equivocal as they acknowledge the inevitable influence of existing knowledge in their following books (i.e., Theoretical Sensitivity (Glaser, 1978) and the Basics of Qualitative Research (Strauss & Corbin, 1990)). In particular, Strauss and Corbin (1998) asserted that the researcher's life experience and prior knowledge from the literature inevitably would influence his/her research and they stressed that the acknowledgement of the influence would be vital. However, they also pointed out the risk of literature reviews interrupting the researcher's creative thinking regarding his/her research. They finally concluded that it would be recommended to review the literature but the researcher should take care to not be overly influenced by the reviewed literature while conducting his/her own research. Similarly, Charmaz (2006) also acknowledged the influence of the researcher's experience and existing knowledge from the literature and advocated preliminary literature reviews so as to fulfil institutional requirements (such as ethical reviews and PhD 1st year review board paper) and to avoid

unawareness of prior evidences. However, she had a negative opinion towards preliminary in-depth literature reviews, especially with novice researchers because they might be preoccupied with existing theories that would prevent them from identifying new emergent categories (Charmaz, 2006). In her later book with Bryant, she highlighted that "*the balance arises between reliance on the literature to provide the framework to start with, something that Glaser and Strauss (1967) particularly took issue with, and having a level of understanding to provide an orientation*" (Bryant & Charmaz, 2007, p. 20).

Based on the above debate about the literature, I dealt with literature as below:

- Preliminary literature review

  I conducted literature reviews with a broad scope of the research topics, not in-depth, in order to understand what is happening in the relevant fields (i.e., contextual backgrounds) and to minimise the influence of pre-existing ideas. In retrospect, this preliminary literature review had a very limited influence on this research during data collection and analysis. Rather, it enabled me to 1) stay close to my data (it is a main discipline of GT) and to 2) creatively generate new categories. Meanwhile, preconceptions from my experience in nursing as a nurse and nursing student were engaged in this research process. Many researchers such as Bryant (2009) and Thomas and James (2006) have positively discussed the use of a researcher's preconceptions in GT, which could be called reflexivity, essential in CGT. My reflexivity played an important role in preventing me from unconsciously adopting the pre-existing ideas from my preliminary literature review and in enhancing my theoretical sensitivity.

- Secondary literature review

  The secondary literature reviews of this research were intensive, focused and in-depth. These literature reviews started when the categories emerged after the third interviews of this research. Namely, I was able to intensively review the literature by focusing on the emerged categories, derived from this research. Furthermore, these literature reviews sent me back to my data, and thus I was able to compare my findings with the theories from existing literature (i.e., part of the constant comparison process in this research).

Meanwhile, Lempert (2007) and Gibson (2007) emphasise that the preliminary literature review plays a role in enhancing the researchers' theoretical sensitivity. Interestingly, I was also able to enhance my theoretical sensitivity during the secondary literature review as I had a chance to revisit my data using constant comparison.

3.4. Ethical Issues

All research has ethical dilemmas and the dilemmas should always be dealt with carefully. Both qualitative and quantitative research should be conducted ethically.

Qualitative research is the main strategy of this research project, but it does create more ethical dilemmas than quantitative research strategies (Holloway & Wheeler, 1995; Parahoo, 2006). For both types of research, the Economic and Social Research Council (ESRC) (2010) suggested six ethical guidelines for research (see Table 14).

Table 14. The six key principles of ethical research (ESRC, 2010, p.3)

1. *Research should be designed, reviewed and undertaken to ensure integrity, quality and transparency*
2. *Research staff and participants must normally be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved*
3. *The confidentiality of information supplied by research participants and the anonymity of respondents must be respected*
4. *Research participants must take part voluntarily, free from any coercion*
5. *Harm to research participants must be avoided in all instances*
6. *The independence of research must be clear, and any conflicts of interest or partiality must be explicit*

To comply with the ESRC guidelines, I received ethics approval from the School of Health in Social Science Ethics Committee at the University of Edinburgh (see Appendix 9: The letter of ethics approval). Addressing ethical concerns, all participants were fully informed about this research, such as its purpose and process, which includes co-construction of meaning with the participants themselves. Participants were assured of the anonymity of their participation (e.g., converting their real names to Korean pseudonyms in this qualitative research phase). Their participation in this research was also requested in a relaxed atmosphere. During all phases of this research, I reflectively reviewed whether any potential harm or risk could be inflicted upon the participants, and the participants were frequently asked about their feelings regarding participation in this research. This research was independent from sponsors or funders, and no conflicts of interest were encountered during the course of this research. Further details of ethical concerns of the two research phases (i.e., quantitative and qualitative research) are supplied as below:

- For the quantitative portion of this research, the University of Edinburgh ethical approval letter was sent to six nursing schools of six different universities in Seoul,

which they all accepted, allowing for the data collection to take place in their schools. Students were informed on the first page of the questionnaire that participation was voluntary and confidentiality was assured. Consent to participate was implied in the filling in and returning of the questionnaire.

- For the qualitative phase of this research, I obtained informed consent from each of the participants. An informed consent required me to explain all information about this research to each participant individually (see Appendix 10). I outlined the information security measures and informed the participants that their information would be treated with strict confidentiality.

- All the participants in both quantitative and qualitative research were informed that they could withdraw their participation during any stage of the study.

However, I was not convinced that all ethical concerns could be resolved only by complying with the ESRC guidelines and obtaining informed consent from the participants. Researchers should always strive to make the right decision when there are no clear ethical guidelines because there are no particular ethical guidelines that would fit all research contexts (Mason, 2002). Thus, as a first step, I established a plan to contact my principal supervisor and the School of Health in Social Science Ethics Committee at the University of Edinburgh in order to respond immediately and actively to ethical issues, should they emerge. However, no ethical issue emerged in the duration of this research.

3.5. Reliability, Validity and Rigour

Researchers need to make a serious effort to achieve research outcomes that are systematic, reliable, and transparent, as well as coherent to readers. This research study used both quantitative and qualitative research strategies. Reliability and validity in quantitative research and rigour in qualitative research all play a crucial role in ensuring the value of the research results (Parahoo, 2006).

Assuring validity and reliability of quantitative research that uses a questionnaire is a vital component. The quantitative research portion of this study achieved satisfactory validity and reliability and it will be discussed later in detail as a part of the findings of this research (see *6.2.1.3 Validity and reliability*).

Qualitative research is subjective, unstructured, undecided and un-standardised by its nature (Parahoo, 2006). Thus, the objective measures of quantitative research's reliability and validity cannot be applied to qualitative research. For this reason, many scholars (e.g. Mays and Pope (1995), Chiovitti and Piran (2003), Parahoo (2006), and Creswell (2007)) assert that qualitative researchers need to increase the rigour with which the qualitative research is conducted, rather than attempting to measure its reliability and validity.

Charmaz (2006) introduced four criteria specifically for evaluating GT and this increases the rigour (see Table 15).

Table 15. Four criteria for evaluation of GT (Charmaz, 2006, pp.182-183)

Credibility
• *Has your research achieved intimate familiarity with the setting or topic?* • *Are the data sufficient to merit your claims? Consider the range, number, and depth of observations contained in the data.* • *Are there strong logical links between the gathered data and your argument and analysis?* • *Have you made systematic comparisons between observations and between categories?* • *Do the categories cover a wide range of empirical observations?* • *Has your research provided enough evidence for your claims to allow the reader to form an independent assessment-and agree with your claims?*
Originality
• *Are your categories fresh? Do they offer new insights?* • *Does your analysis provide a new conceptual rendering of the data?* • *What is the social and theoretical significance of this work?* • *How does your grounded theory challenge, extend, or refine current ideas, concepts, and practices?*
Resonance
• *Do the categories portray the fullness of the studied experience?* • *Have you revealed both liminal and unstable taken-for-granted meanings?* • *Have you drawn links between larger collectivities or institutions and individual lives, when the data so indicate?* • *Does your grounded theory make sense to your participants or people who share their circumstances?* • *Does your analysis offer them deeper insights about their lives and worlds?*
Usefulness
• *Does your analysis offer interpretations that people can use in their everyday worlds?* • *Do your analytic categories suggest any generic processes?* • *If so, have you examined these generic processes for tacit implications?* • *Can the analysis spark further research in other substantive areas?* • *How does your work contribute to knowledge? How does it contribute to making a better world?*

This CGT research adopted the four criteria in order to examine and increase the quality and rigour of this research:

- Credibility:

  To increase the familiarity of the research topics and setting, I tried to consider the contextual backgrounds in which my research topics were taking place. As a result, I introduced contextual factors that influenced nursing students' learning in the following findings chapters. Throughout the theoretical sampling and memoing, I collected sufficient data and then a wider range of data to understand nursing students' learning dynamics (i.e., I achieved theoretical saturation). Moreover, throughout the theoretical coding and rendering using constant comparisons, I was able to identify the relationships between emerged categories and thus construct integrated findings for the research topics.

  For the credibility of this research and the validation of processes, the processes of systematic data collection and analyses have been explained in earlier sections of this chapter and were confirmed by my supervisors and the participants. Furthermore, a systematic process was adopted to minimise translational limitations for the credibility.

- Originality:

  This research was able to discover new categories and conceptual frameworks regarding the nursing students' learning, compared to existing research studies as a result of using the CGT methodological techniques. The originality of new findings were confirmed during literature reviews in Chapter Seven: Discussion. The findings from this research are expected to contribute to the understanding of the nursing students' learning dynamics with added new insights to nursing

pedagogics.

- Resonance:

  As this research achieved theoretical saturation, I believe that the students' experiences of nursing education in Korea were sufficiently explained through diverse interpretations (e.g., emotional, environmental and socio-cultural aspects). Moreover, a series of four interview stages was conducted to define taken-for-granted meanings from the participants, which I, as both an insider and outsider, interpreted.

  As this research was co-constructed with participants, they examined my findings and then independently confirmed the findings (i.e., member-checking). In particular, Junho and Gayoung were newly invited to specifically examine the findings derived from different participants (i.e., independent review) as the final verification of the findings.

- Usefulness

  The research findings of this research were grounded in the data collected and I tried to preserve the participants' voice. In addition, this research included both the participants' general and specific experiences of nursing education. Thus, it is expected that the findings are practical and can be applied to improve nursing education. However, further research studies will be required to confirm the findings due to the originality of this research. The usefulness of this research will be discussed further in Chapter Seven.

3.6. Limitations

All research has limitations that are determined by its special context. This research also had some limitations. The limitations are divided into three parts: 1) limitations of mixed method research, 2) limitations of qualitative research, and 3) limitations of quantitative research.

3.6.1. Limitations of mixed method research

The reason why mixed method research is challenging is that the issue of paradigm contradiction between quantitative and qualitative research is unavoidable, as paradigms of both qualitative and quantitative research can be incompatible in a research study (Greene, 2006; Morse & Niehaus, 2009). I also acknowledged that this paradigm issue could be problematic in this research. However, Miles and Huberman (2014, p. 42) assert that "*The question is not whether the two sorts of data and associated methods can be linked during study design, but whether it should be done, how it will be done, and for what purposes*". In other words, I adopted the mixed method research, because I believed that in order to explore nursing students' learning dynamics with ICT, the strength of the method far outweighed the paradigm issues as the method would provide a richer understanding than single research design. Morse and Niehaus (2009) stressed that it is necessary to acknowledge the supplementary role of one research design (i.e., qualitative or quantitative research design) in mixed method research as a means of overcoming the paradigm issue and of taking the advantages of mixed method research.

In order to minimise the paradigm issues, the quantitative and qualitative components of this research were independently conducted from each other, and the findings of both components were mixed in the results phase. Moreover, this research attempted to assure the validity and reliability in quantitative research and the rigour in qualitative research.

Mixed method research generally takes more time to conduct than other single method designs (Johnson & Onwuegbuzie, 2004) and thus it can be a challenge for PhD students due to limited time. However, I believed that the mixed method research design would add greater value to this research. Therefore, I made an effort to manage my time by making detailed schedules before carrying out this research.

3.6.2. Limitations of qualitative research and Grounded Theory methodology

Many qualitative researchers conventionally and carelessly raise the issue of generalisability of their findings as a research limitation. Many research methodologists such as Johnson and Onwuegbuzie (2004) also pointed out generalisability as a weak point of qualitative research and some qualitative researchers dismiss the discussion of generalisability as inappropriate in qualitative research studies due to the nature of qualitative research (e.g., consideration of the importance of individuals' unique experiences) (Polit & Beck, 2010). Moreover, the CGT methodology, which is classified as qualitative research and adopted in this research, stresses the researcher's subjective interpretation (i.e., reflexivity). Thus, it

would be hard to discuss generalisability in CGT research.

However, although it would be arguably difficult to reach generalisability through qualitative research due to sampling methods, if qualitative researchers want to construct a theory using a qualitative research methodology (particularly GT methodology), they are required to consider and/or seek 'a certain level' of generalisability. Namely, researchers should take into account the practical applications of the theory, as Thorne (1997, p. 124) argues that "*researchers in this field [i.e., qualitative research in healthcare fields] are obliged to consider their findings 'as if' they might indeed be applied in practic*e''. For this issue, Smaling (2008) argues that generalisability can be achieved by theoretical methods in qualitative research. He states that "*The theory that is ultimately formulated must then become the vehicle for generalisation to other cases that have not been studied… There is indeed no generalisation from a statistical representative sample to a population, but there is generalisation from one case to other cases that belong to the scope of the theory involved. I would prefer to call this 'theoretical generalisation'* [or 'analytical generalisation']" (Smaling, 2008, p.54). Thus, in seeking the analytical generalisation in this research, I attempted to achieve theoretical saturation via CGT guidelines from Charmaz (2006), such as theoretical sampling. Moreover, the quantitative component of this research strengthened the generalisability of the qualitative research findings regarding nursing students' usage of ICT (see Chapter Six).

Above, I used the terms of 'a certain level of generalisability' rather than using just 'generalisability'. This is because qualitative research studies (as well as quantitative research studies) are conducted within specific contextual and environmental

boundaries, and thus it is difficult to achieve perfect generalisability (Polit & Beck, 2010). Therefore, researchers of both qualitative and quantitative research are required to seek a 'relative concept' of generalisability rather than seeking perfect generalisability. Kerlinger and Lee (2000, p. 474) recommended researchers to consider this question when considering generalisability: "*How much can we generalise the results of the study?*", rather than considering 'Are the findings generalised?'

According to this way of thinking, this research seeks for the findings of the qualitative research portion to be [theoretically] generalised within the geographical boundary of Seoul, Korea with nursing students who would have the experience of clinical placements and are studying in a nursing school that offers a bachelor's degree. Further research studies should follow for more in-depth understanding of the findings. In other words, researchers who want to apply the findings to contexts different from that of this study (e.g., nursing education in the UK or other areas of Korea) should be aware of the boundary of generalisation (i.e., limitation of the research).

As a minor limitation of the qualitative research, project and time management can be a challenge due to the laborious, complex and time-consuming process of CGT methods such as line-by-line coding, transcription and constant comparison (Backman & Kyngäs, 1999). In order to resolve this limitation, I used Nvivo 10 for systematic analyses of data and thus I was able to manage this research as planned.

3.6.3. Limitations of quantitative research

As Polit and Beck (2010) argue, the generalisability issue can be raised not only with qualitative research, but also with quantitative research. The quantitative component of this research was conducted in Seoul and used a convenience sample. The results of this study may thus not be generalised to nursing students studying in other regions of Korea or in other countries. Secondly, there was a limitation with regards to the sufficiency of included factors influencing nursing students' attitudes toward ICT. Although this study attempted to accept diverse conceptualisations of attitudes toward ICT, it did not cover all aspects of the attitudes, which are currently being proposed in the research field, such as age, gender and confidential issues (Ward *et al.*, 2008). However, the recruited sample size was statistically sufficient for analysis in this research, thus diminishing this limitation.

3.7. Conclusion

This chapter has introduced and critiqued the rationale to select a mixed method research design (i.e., the cross-sectional study as a quantitative study and CGT as a qualitative study) as a research strategy to enable the exploration of nursing students' knowledge building dynamics with ICT during clinical placements. Particularly, CGT has been utilised to construct a theory that explains the dynamics, as it offers a systematic and rigorous way to construct the theory. This theory can be classified as a substantive theory as it explores a specific phenomenon, but this research also examined the possibility of it being a formal theory.

This chapter also explained the data collection and analysis processes of both portions of this study in detail. Moreover, this mixed method research has attempted to assure the reliability and validity of quantitative study via statistical strategies and the rigour and quality of qualitative study by considering Charmaz's (2006) four criteria, as well as ethical considerations and my reflexivity. However, I acknowledged the limitations of the studies and also discussed it in detail. In the following three chapters, the findings of this research that were derived from these methodological strategies will be discussed.

CHAPTER FOUR: KNOWLEDGE BUILDING DYNAMICS

4.1. Introduction

Throughout the following three chapters (Chapters Four, Five and Six), the pertinent findings of this research will be discussed and presented with quotations from the intensive interview transcripts. The findings in Chapters Four and Five analyse nursing students' knowledge building processes in three contexts (i.e., in the classroom, during clinical placements and SBL). Following these two chapters, nursing students' usage of ICT for nursing education will be discussed in Chapter Six.

This chapter focuses on the knowledge building process in addressing the findings pertinent to nursing students' views towards information and knowledge, and its mutual relationship.

The terms 'information' and 'knowledge' are quite ambiguous and illusive. However, the nursing students in this study were able to define and use both clearly and consistently. The offered definitions of the two concepts reveal the cognitive process generally undertaken by the nursing students who participated in this research to convert nursing information into their own knowledge. This process comprises of three phases. First, the process begins with the nursing students 'connecting with information,' wherein they connect with relevant and available information, predominantly in the form of nursing textbooks, written papers and digital resources, such as the internet. Once a connection to the information is established, they move to the second phase of the process – that of 'deciding to accept the information'. In this phase, five motivating factors (interest, necessity, volition, utility and frequency)

influence their decision. The final phase of 'building knowledge,' allows for the demonstration of different stages of knowledge, which are 'memorising,' 'understanding,' 'synthesising and applying' and 'creating.'

4.2. What information and knowledge means to nursing students

Nursing students are able to differentiate between and identify the unique characteristics of information versus knowledge. Thus, despite the interrelation between the two concepts, findings show that they are nonetheless distinguishable. This section will discuss the different characteristics unique to information versus knowledge, but will also demonstrate the nature of their interdependency.

Nursing students distinguish information from knowledge by using the concepts of non-subjectivity and subjectivity, respectively. Insofar as they assume that information exists outside of them (as a fact), they do not subjectively engage with the information (i.e., non-subjectivity). Conversely, knowledge is assumed to be related to their subjectivity, as it exists within them. Therefore, it can be surmised that the students understand the two concepts as one of relativity (i.e., subjectivity versus non-subjectivity).

> *Knowledge is the knowledge that is in my mind, but information just exists around me.* (Bora, Nursing student)
>
> *Information just exists, outside of me... I believe what I know is my knowledge, which cannot be known by others. Therefore, knowledge is a very subjective thing, but information is not.* (Sarang, Nursing student)

As is demonstrated by Bora and Sarang, the relativity is identified by the location of information, and its location therefore denotes whether something is accepted as information or knowledge. Moreover, Sarang contends that knowledge is personal; thus, if another person shares this specific knowledge it cannot be rendered as knowledge, but rather, information. In this way, knowledge can be understood as one's interpretation in the first person perspective (i.e. subjectivity). Garam further confirms:

> *When I share my knowledge with others, the knowledge becomes information to the others. This is because others objectively receive my knowledge… Moreover, if my friend just tells me her knowledge, it is also not my knowledge, but is just information to me.* (Garam, Nursing student)

The antonym of 'subjective' is 'objective', which is defined as "*based on real facts and not influenced by personal beliefs or feelings*" (Cambridge Dictionary Online, 2014). However, as the students explain information and knowledge as existing in locations related to self, information cannot be seen as free from personal interpretation. Thus, 'non-subjective' in lieu of 'objective' is deemed a more appropriate term, and is adopted for the remainder of this research.

Likewise, information and knowledge can also be understood via the relationship of ownership. When information is in one's possession, it is judged to be his/her knowledge, whereas, when information is not one's possession, it remains as information.

> *Information is not mine yet. On the other hand, knowledge is something I already possess… Namely, I think information is to be obtained [from outside of myself], but knowledge is to be possessed.* (Yoonjin, Nursing student)

As Yoonjin clarifies, there is a difference between something that is 'to be obtained'

and something that is 'to be possessed.' The Cambridge Dictionary Online (2014) defines 'obtain' as "*to get something, especially by asking for it, buying it, working for it, or producing it from something else.*" The definition of 'possess' is "*to have or own something, or to have a particular quality*" (Cambridge Dictionary Online, 2014). These two definitions demonstrate the commonalities between the two terms, but also identify the slight differences. For example, the definition of 'obtain' highlights the relationship between two objects, wherein one 'obtains' or gets something from another; the question of ownership with something 'obtained' is not addressed. The meaning of 'possess,' however, focuses on a current state of ownership. It would therefore be useful to think of these terms as nuanced versions of 'to get' (a potential) and 'to have' (an actualisation). Yoonjin views the difference between information and knowledge through a lens of ownership (i.e., information remains outside of her and does not belong to her, whereas knowledge is something she owns, something inside of her). Wanki, another nursing student, further supports this view, asserting, "*[knowledge] is to be mine*". (Wanki, Nursing student)

While the differences between information and knowledge are clear, the students also evidence an interrelationship between the two concepts, as they exist together in a process. As was discussed above, knowledge insinuates subjectivity and possession, for "*when information comes into the person's mind*, *the information will be one's knowledge"* (Bora, Nursing student). Dahee and Eunju also indicate the process between non-subjective information and subjective knowledge:

> *[Knowledge is] the subjectification of a fact. A fact is information. [Information] does not contain my judgement about that fact. If I add my judgement to that fact, it becomes knowledge.* (Dahee, Nursing student)

> *Information is non-subjective and knowledge is subjective. When I make an effort to understand or experience the [non-subjective] information, the information will become [my subjective] knowledge.* (Eunju, Nursing student)

The participating nursing students thus believe that information is a primary source for building knowledge. The relationship between information and knowledge can be understood as an internal cognitive process, whereby information becomes personally embedded. For example, Garam contends:

> *If I were to define information, it would be visual or auditory stimulations, which have not yet undergone any processing, right at the moment I encounter it. Information that has been interpreted and acquired through my internal processes would be my definition of knowledge.* (Garam, Nursing student)

Throughout this section, the nursing students' identified the dissimilarities and interconnectedness between the concepts of information and knowledge. In the following section, the internal process of the information-knowledge transformation will be discussed in detail.

4.3. Process of knowledge building

Nursing students' knowledge building process occurs within the students' minds as cognitive activities and consists of three phases: 'connecting with information,' 'deciding to accept information' and 'building knowledge.' These steps do not signify a rigid step-by-step process forwards (i.e., connecting with information → deciding to accept information → building knowledge), but rather denote a process that proceeds bilaterally in a consistent stage of flux (i.e., connecting with information ↔ deciding to accept information ↔ building knowledge) (see Figure 7).

Figure 7. Information-knowledge cogwheel process

4.3.1. Connecting with information

Information exists as a source of knowledge, as was discussed in the previous section. Thus, the knowledge building process starts with connecting with information, which is located in one's external world. There is a significant amount of information that exists in the outside world and thus there are many sources of information available to nursing students. Formal nursing education in Korea typically takes place in three unique contexts: classrooms in universities, SBL in university laboratories, and in real clinical environments (i.e., in hospitals). Together, these three contexts produce an enormous amount of information and thus the forms of information with which nursing students connect, vary greatly. Despite multiple forms of information coexisting in each context, the dominant form of information that nursing students connect with in each of the three learning contexts are 1) auditory, via academic lectures and 2) visual, through observing nurses' practices and clinical environments. Moreover, the students can also connect via 3) a performing form of information, realised during SBL. In this

training, nursing students can connect with information by implementing nursing practice scenarios, which are provided by simulation instructors. Although each context offers various and unique forms of information, from which nursing students can connect, their primary source of nursing information comes from "*textbooks and the internet*" (Dahee, Nursing student), along with published nursing studies as a text form of information (i.e., reading written language).

4.3.1.1. Paper textbooks

Most of the nursing students who participated in this research claimed to prefer using printed textbooks when obtaining nursing information:

> *My main source [of nursing information] comes from textbooks… I think the textbook contents provide the fundamentals [of nursing studies]. As I learn from [the textbook], I will look up other things I am curious about.* (Hwashin, Nursing student)

> *Nursing textbooks propose the direction in which we should engage in nursing studies and provide accurate [nursing] information.* (Dahee, Nursing student)

Hwashin and Dahee both regard textbooks as their main source of nursing information, similar to other nursing students. Interestingly, although they assert that they have had exposure to ICT throughout their lives (see Chapter 6) and recognise that ICT can be beneficial in receiving information, they continue to favour hard-copy textbooks. Nursing students' preference for textbooks can be explained by three factors. First, they indicate strong feelings of trust and reliability with the textbooks they use to obtain nursing information:

> *Textbooks are only published after research and the like are formally conducted.*

> *That is why textbooks are accurate and reliable… Using the textbooks is preferable in comparison to ICT, because the textbooks are official and reliable. Moreover, textbooks are reliable because they are from a trustworthy source.* (Yoonjin, Nursing student)
>
> *It would be textbooks. The reason is because on the first page of the textbooks, I can see the names of all the contributing authors and reviewers. As they all hold authority in their fields, I feel that textbooks are more reliable.* (Wanki, Nursing student)
>
> *When I share something with others and use a textbook reference, they would have more confidence in it because my information source is more reliable.* (Bora, Nursing student)

These nursing students thus regard the reliability of the information source to be a priority when selecting resources for their nursing studies. Furthermore, they believe that textbooks are reliable given that they are written and notarised by nursing and published professionals.

The second reason as to why they prefer textbooks to other information sources is that they are accustomed to being educated with textbooks, following the traditions and conventions of nursing education in Korea:

> *[I use textbooks], because I was taught with textbooks.* (Sori, Nursing student)
>
> *In nursing studies, it is more common to obtain nursing information from textbooks than from ICT to build nursing knowledge… I think to use textbooks [to obtain information] is a custom that has been passed down… because people who guide my education, such as my lecturers, and seniors, learnt using textbooks.* (Hyemin, Nursing student)

Hyemin's statement in particular, provides a clear example of why some nursing students prefer to use textbooks. Insofar as they were previously taught with textbooks in their nursing school, this is a familiar learning mechanism and thus they merely reassert the tradition of nursing pedagogy through the use of textbooks.

Lastly, lecturers in nursing studies often reinforce textbooks as a source of nursing information.

> *I think lecturers believe that textbooks are accurate. To be honest, I don't know why they tell us to use textbooks. They would say, "You absolutely have to use textbooks", "Refrain from using the internet". I don't think it is right…* (Yoonjin, Nursing student)

Additionally, Sua points out that her trust and extensive use of textbooks stems from her desire to achieve good marks, because "*all examination questions in nursing studies are from textbooks*" (Sua, Nursing student). This is a pedagogical convention across Korea, and is not unique to nursing, per se.

4.3.1.2. Digital resources

While textbooks serve as the primary medium for obtaining information, given their reliability and the conventions of Korean nursing education, nursing students also "*obtain plenty of information about nursing from digital resources*" (Bora, Nursing student), particularly from the internet. However, while they fully understand the advantages of using digital resources, it does not serve as the main source of information in their nursing education, despite valuing that "*it is easy and convenient to access nursing information*" (Dahee, Nursing student).

> *As I cannot just use one textbook, I use textbooks as a basis to search for [additional] information. Like this, I use two [sources] to obtain information. I would first read textbooks, and when I feel that it is lacking and I need more information, I would search for digital resources to add to it. I only use these two sources.* (Sori, Nursing student)
>
> *I would chiefly use nursing textbooks. I would use ICT if I need further elaborations [on the textbook contents], but it is not the main source [of*

information]. (Wanki, Nursing student)

These two examples demonstrate that textbooks are the main medium from which information is obtained while digital resources are used as a secondary source by nursing students. Nonetheless, it is evident from the above quotations that digital resources, mainly from the internet, plays an important role in obtaining information. Although it does not serve as a main source of information, digital resources are necessary in extending and expanding on the concepts introduced in the nursing textbooks. As a result, nursing students can more effectively and efficiently learn nursing using digital resources. Yoonjin adds below:

> *The most frequently used [information source] is textbooks, but I think I have obtained more nursing information from the internet. For instance, a nursing textbook explains something in only three sentences, but there are a lot of explanations about that same thing on the internet. Hence, when I come across something that I don't understand in the textbooks, I look it up on the internet.* (Yoonjin, Nursing student)

One of the reasons why nursing students regard digital resources as a secondary source of nursing information is due to their concerns about the reliability of nursing information available on the web:

> *The reliability [of information from the internet] is questionable. So, we have to be selective [of the information from the internet]*. (Hwashin, Nursing student)
>
> *There is so much unverified and unreliable information on the internet, so we have to first sift those out.* (Sori, Nursing student)

Hitherto, this section has verified that nursing students prefer to connect with nursing information via textbooks and digital resources, as compared to other forms of information. Thus, one can assert that nursing students tend to favour written forms of information (i.e., the text form) rather than other forms, such as auditory, visual, and performing information, although notably the other forms also play an important role

in nursing education. In this way, textbooks and digital resources act as the preferred sources in obtaining or connecting with nursing information, but this in no way implies their effectiveness or quality. Nursing students also believe that the other forms of information are fundamentally based on textbooks used in nursing education and thus its sources can always be traced back to the textbooks. Sori and Bora's examples discuss this point:

> *I get nursing information from textbooks and lectures… Anyhow, the lectures are based on textbook contents, and clinical placements are based even more on textbooks.* (Sori, Nursing student)
>
> *I have to first study my textbooks before going on clinical placements…* (Bora, Nursing student)

As a reflection upon the characteristics of knowledge, which is the result of active, personal, and subjective internal processes, the students also connect with information privately as a way to build their knowledge. Nursing students prefer to study with the written forms (i.e. the text form) during their private time when reviewing the auditory, visual, and performing forms of nursing information they have already connected with in formal nursing educational contexts.

> *I obtain information from 80~90% of lectures, and during breaks or other time outside of class, I would try to understand the information through revision. Ultimately, I have to study independently to gain knowledge [from the information]… Also, [during my clinical placements] I would write down all the patients' information from the EMR and organise it at home.* (Yoonjin, Nursing student)

Based on Yoonjin's experience, she requires the use of personal time to actively consolidate the various gathered forms of information for her knowledge building, using her own words, or through reaffirmation via textbooks or the internet. This

enables her to connect written forms with various other forms of information.

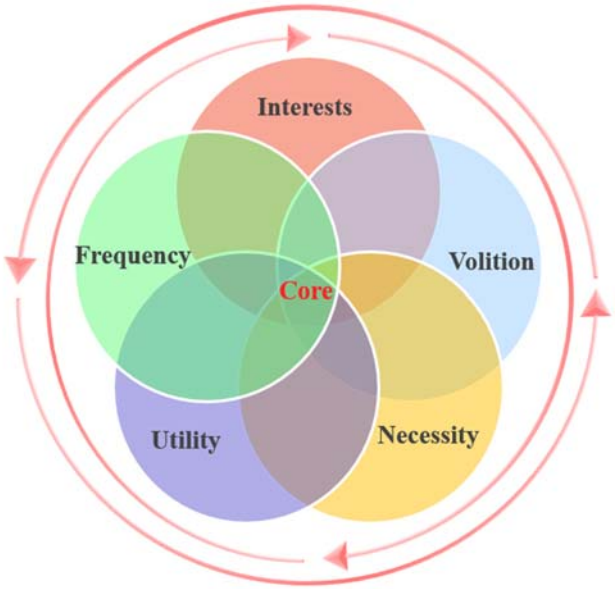
4.3.2. Deciding to accept information

Due to the plethora of nursing information available in a variety of sources, it is near impossible to connect to every piece of information in a clear and comprehensive way that allows for knowledge building. Students must then partake in an active decision-making process, wherein they rationally make a decision about the information they connect with to build knowledge. Wanki, Dahee and Sua exemplifies this as below:

> *We can actively or passively recognise information, however I think to build knowledge, an active process is required. We need to have the volition…* (Wanki, Nursing student)
>
> *Anyone can access information… Nursing information can be taken from materials such as textbooks… Knowledge is taking that [information], making a decision about it to make it my own.* (Dahee, Nursing student)
>
> *I don't take information as it is. Rather, I need to have the ability to make a rational decision [about the information to build knowledge].* (Sua, Nursing student)

As these three students indicate, the connection of information does not imply that it will be automatically internalised during the knowledge building process, but rather, an active decision-making process must first be undertaken. As was previously mentioned, knowledge building involves an internal process of learning. Hence, individual motivation in deciding whether to accept or reject information plays a crucial role in the knowledge building process. This research will demonstrate that the decision-making process is motivated by five factors: learners' interest, necessity of information, volition to learn, utility of information, and the frequency of information (see Figure 8).

Figure 8. Five motivational factors



4.3.2.1. Interest in information

Nursing students value information they are interested in, inciting them to build it into knowledge, as is typified by Wanki and Dahee:

> *If someone explains a type of medicine to me, I would just say "oh I see," and then move on other topics. However, if I am interested in a particular type of medicine, I would go home and look it up. This way, I would understand better. When I obtain information by searching [for the information I am interested in], that information will become mine.* (Wanki, Nursing student)
>
> *It depends on my interest. When I read an article or a long book, I only remember the parts that I am interested in. I think the information that is not interesting is hard to remember.* (Dahee, Nursing student)
>
> *The more interested I am [in certain information], the more I will think about that particular information, allowing me to go through a feedback process [which also results in the building of knowledge].* (Eunju, Nursing student)

As the above students indicate, specific information that is interesting to them is more likely to be recalled and actively pursued, and as Eunju mentions, that information

goes on to be used to build knowledge. Therefore, amidst a sea of information, interests allow the student to choose which information they want to use to build nursing knowledge.

4.3.2.2. Necessity of information

Necessity of information also influences the decision-making process and contributes to the transformation of information to knowledge.

> *If I feel [the information] is important or absolutely necessary, I try to remember it. However, if it is just simple or interesting news, it is just temporary [so I don't remember it]. I make knowledge from information that I need.* (Wanki, Nursing student)

> *When I find information and I feel it is necessary to make knowledge from the information, I keep looking at it and try to understand it [for knowledge building]. If the information is not necessary for me, it becomes information that I know only for that moment.* (Yoonjin, Nursing student)

In the above two examples, the nursing students divide information into two parts: information that is considered necessary or unnecessary. When the nursing students feel that certain information is necessary, they are motivated to actively remember and even understand that information, as opposed to more trivial information. Thus, the necessity of certain information influences their motivation to transfer or build that information into their knowledge. This necessity factor correlates to the nursing students' duties and responsibilities, helping them to determine which information is necessary and which is not. In order to register and practice as a nurse, students must be equipped with the essential nursing knowledge to meet the qualification requirements. Moreover, they should strive to apply this knowledge in clinical contexts

once becoming a nurse. The demands of being a nurse indicate the necessity of obtaining relevant nursing information. Miran indicates this point:

> *The demands of my surroundings? The contexts around me demand [the acquirement of necessary nursing information]. I mean, the fact that I come to university for my education, that in itself places a demand on [to obtain nursing information].* (Miran, Nursing student)

As Miran's quotation suggests, it is both common and expected of nursing students to acquire and learn relevant information under an educational context. Hence, as a result of their title as students and as future nurses, they are faced with the necessity of obtaining the required information for their field.

4.3.2.3. Volition to learn

The volition to learn is one of factors that has an effect on the decision making process. When nursing students carry with them a strong volition when attempting to learn something, it positively influences the creation of knowledge via information.

> *Firstly, I think my attitude is very important. If I do something passively, I obtain just a little [information], whereas if I make an effort to learn a lot, I can obtain a lot… the active part contains a lot of my own volition… Self-directed learning is the most important. The volition to learn is just the beginning. I have to take the lead myself when trying to do something, don't you think?* (Hwashin, Nursing student)

As Hwashin asserts, the power to lead one's own study is essential in the decision-making process and a crucial factor in building knowledge in nursing studies. The factor of volition is a similar concept to that of self-directed learning, as Hwashin states. Moreover, Hwashin points out that volition is connected with personal effort and drive.

Volition encourages students to make the active efforts required of self-directed learning. Yoonjin also talks about both volition and effort as influential elements in acquiring nursing information:

> *If I am resolute in building knowledge, I can obtain a lot from textbooks to build knowledge, whereas if I just read a book without volition, the information is just fragmentary…*

Similarly,

> *If I put in the effort to obtain information during my clinical placement, [the information] will become my knowledge, whereas if I just pretend to listen to a nurse's explanation, it will remain as ordinary information.* (Yoonjin, Nursing student)

As is argued above, nursing students' volition is a crucial factor when deciding whether to accept or reject nursing information, and volition is a necessary condition for stimulating the nursing students' efforts in learning and partaking of self-directed learning.

4.3.2.4. Utility of information

The decision to select information for knowledge building is affected by the expected level or rate of its utility. When nursing students predict that the information they connect with has a high utility rate, they are more motivated to transform that information into knowledge.

> *I think knowledge is built by information that can be utilised*. (Garam, Nursing student)

As is evidenced by Garam's quotation, nursing students attempt to acquire nursing

information when they '*believe*' the information has a high potential for being utilised. To 'utilise' is "*to use something in an effective way,"* according to the Cambridge Dictionary Online (2014). The term thus focuses on the effective usage of something, and having a high utility rate indicates being able to use something effectively again and again. Hence, when the students regard certain information to have the potential to be used effectively in several educational and practical settings, they accept that information to build knowledge. Expected utility is subjective and is thus judged by each individual nursing student. Hyemin adds to the concept of the utility:

> *I don't think I can build knowledge from all the information I encounter in everyday life. When I continuously utilise certain information, that information would turn into knowledge… For instance, I [obtained information] about nursing in neurology. If I know I will utilise this information for my presentations or in my practice later with real patients, it will eventually become knowledge, as the information will be continuously utilised. However, if I don't utilise the information, it would not become knowledge.* (Hyemin, Nursing student)

As above, Hyemin expressed her understanding of the necessity of continuously using certain information to build her knowledge in a particular area, which underpins her decision-making process, by way of expected utility, on what information to connect with and to obtain for her knowledge building.

4.3.2.5. Frequency of connecting with information

The frequency of connecting with specific information is also one of the influential factors that impacts the decision-making process. When nursing students frequently and repeatedly connect with certain information, the information tends to linger in their minds. For example, while studying, the students may continue to connect with certain

information. If this frequency increases, it increases the chances that it will be built into knowledge. If the frequency, however, decreases, the chances of that information becoming knowledge will also decline. Frequency corresponds to time, as the dictionary definition of 'frequency' is "*the number of times something happens within a particular period, or the fact of something happening often or a large number or times*" (Cambridge Dictionary Online, 2014). Within a particular time period, the number of connections made with certain information can influence the students' decisions to build knowledge.

> *If I connect with the information frequently, the information will get stuck in my mind and can turn into knowledge.* (Bora, Nursing student)
>
> *If I don't connect with the information frequently, I will forget it. Therefore I think [the information] has an expiry date!* (Dahee, Nursing student)
>
> *I can't really remember the information that I learnt during my first and second year.* (Garam and Yoonjin, Nursing students)

Evidently, frequency involves a process wherein information becomes essentially ingrained in the nursing students' minds. Regardless of the students' intentionality, repeated connections with certain familiar information reinforce the decision-making process and increase the chances of it becoming knowledge. Although this factor is the least active process of which the nursing students engage in, it is nonetheless revealed as one of the five factors that influence the transformation of information to knowledge.

4.3.3. Building knowledge: Stages of knowledge (Knowledge development process)

As was argued in the previous discussions of knowledge, knowledge is located in one's

mind and is possessed by the individual. Through the decision-making process, information becomes knowledge and thus implies ownership. Although nursing students make relatively conscious decisions about what information should become knowledge, not all knowledge is of the same quality. Rather, different quality, or, in this research, different stages of knowledge exist concurrently.

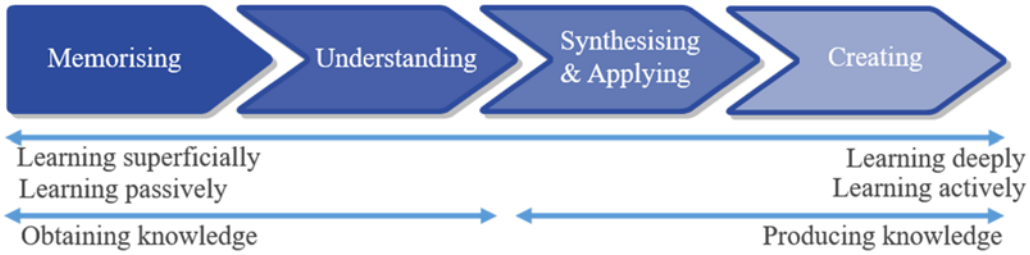
> *I think there are different stages of knowledge.* (Ari, Nursing student)
>
> *I think there is a distinction in the quality [of knowledge].* (Hwashin, Nursing student)

The distinction between stages of quality knowledge is affected by the different decision-making factors, as was discussed in the former section. For example, if a nursing student connects to information because he or she deems it necessary, then that student actively decides to accept the information as knowledge. However, the quality of knowledge varies depending on his/her perceived level of necessity of the information. If the student considers the information to be extremely pertinent, it will likely reflect a higher quality of knowledge, as the student will have a strong motivation to acquire such knowledge and will take on a more active learning attitude. Furthermore, when nursing students involve more motivational factors in their decision-making process (i.e., approaching the core as is shown in Figure 8), they also build higher quality knowledge. For instance, if a nursing student is particularly interested in stroke nursing care, he or she will have the volition to study about stroke and thus will connect with information on stroke more frequently. As a result, the student can build a higher quality knowledge compared to another student who has less motivation to learn about stroke (e.g., only needing nursing care information on stroke for the purpose of taking examinations). Therefore this stage of building

knowledge is closely intertwined with the former decision-making process and the identified five factors.

As the examples above indicate, the remainder of this section will discuss what comprises of 'better' quality knowledge. Based on the analysis of the interview findings, knowledge is divided into four different stages that is derived from four knowledge building methods: memorising, understanding, synthesising and applying, and creating (see Figure 9).

Figure 9. Four stages of knowledge



4.3.3.1. Memorising

Students in Korea have been trained to focus extensively on memorisation as a study method to ensure high marks on exams (Korean nursing pedagogy will be discussed in Chapter Five). This trend of learning is also witnessed in nursing schools throughout many universities in Seoul, Korea. The nursing students who participated in this research, additionally indicate memorisation as the primary method used to study nursing.

> *Memorisation, as opposed to understanding, is more common in nursing studies. It might just be in my case, but during my 1st and 2nd year… I studied under a lot of pressure [given the focus of memorisation]…* (Wanki, Nursing student)

> *I have to memorise, without question. I sit down, open my textbook, and then make summaries. After that I just memorise the summarised notes repeatedly, then try writing it out again… I usually study like this.* (Dahee, Nursing student)

Despite the fact the students acknowledge memorisation as the most common study tool in nursing education, they contend it generates the lowest stage of nursing knowledge. Garam and Hyemin further stress this fact:

> *The lowest stages of knowledge are simple memorisation or cramming of information.* (Garam, Nursing student)

> *The reason as to why I think knowledge from memorisation results in a lower stage of knowledge is because I think my own feedback through internal processes need to be included in order to become a higher quality of knowledge. However, the knowledge resulting from simple memorisation and cramming [my mind] does not include this internal process, so I see it as a lower stage of knowledge… It also doesn't stay [in my mind] for long.* (Hyemin, Nursing student)

Nursing students consider memorised information that exists in their mind without any of their own feedback as the lowest stage of knowledge. Moreover, they express that this knowledge is more easily forgotten or disregarded. At the beginning of this chapter, nursing students defined knowledge as facts with the addition of their ideas or opinions (i.e., information). Memorised knowledge does not meet the definition of knowledge explicated in this research, insofar as memorisation does not encourage the addition of the students' own ideas or opinions, but merely fosters the original contents of the information. Moreover, memorisation incites a passive nature of learning that is prevalent throughout the education culture in Korea. Nonetheless, memorisation results in information, which becomes possessed by an individual through the individual's active internal decision-making processes (e.g., frequency of information). Therefore, the nursing students acknowledge that memorisation is a type of knowledge building, but results in the lowest quality of knowledge.

4.3.3.2. Understanding

When nursing students discuss about memorisation, they ruminate on whether memorisation leads to knowledge creation or not. Whilst they often surmise that memorisation does result in a form of knowledge, they are not always satisfied with this conclusion, again due to the fact that knowledge obtained via memorisation qualifies as the lowest stage of knowledge. The concept of in-depth understanding, however, leads to different results, wherein the students do not hesitate to attribute understanding as an authentic and beneficial form of knowledge building. The students contend that understanding is a key aspect of the knowledge building process and results in a higher stage of knowledge than does memorisation.

> *Knowledge is when I understand something. Not through someone else, but when I personally see and understand something, it becomes my knowledge… Rather than just memorising sentences in textbooks, understanding the content will produce a higher level of knowledge.* (Yoonjin, Nursing student)

> *Understanding is surely a superior concept [to that of memorisation]. Memorisation is just like taking a picture but I can't see what is inside the picture. Understanding means to know how the picture was taken.* (Miran, Nursing student)

According to the picture metaphor offered by Miran, the knowledge gained from understanding includes not only the information that nursing students decide to accept at face value, but also the related causal and influential information. This means that through in-depth understanding, students are able to view the multi-dimensional properties of information, rather than observe it as solely one-dimensional. Thus, understanding allows for a more expansive and comprehensive output of knowledge than that of memorisation. At this stage of knowledge, the possibility to connect and further expand knowledge exists, resulting in an even higher stage of knowledge

through synthesis and application, which will be discussed in the next section. Hwashin provides an example of her knowledge, which is derived from her understanding of the information and its multi-dimensional properties:

> *Knowledge is to know why dietary fibre is good for constipation rather than to simply know that it is… We can just tell the patients that dietary fibre is good for constipation, and it is information for them. For us, understanding the fundamentals of how fibre is processed in the human digestive system and how and why it produces a certain beneficial effect – that is knowledge.* (Hwashin, Nursing student)

As knowledge acquired through the process of understanding has the possibility to expand, interrogative questions such as 'how' and 'why' are valuable, allowing for the exploration of multi-dimensional properties that enable a deeper understanding of the information. Conversely, questions examining 'what' tend to be asked in relation to the memorisation method, as they may correspondingly restrict the scope of knowledge. In nursing education, particularly education during clinical placements, knowledge via understanding enables nursing students to think critically and act appropriately in the unpredictable clinical contexts. Such thinking is not provoked through memorisation. Thus, knowledge built from understanding is a basic, but essential stage of knowledge that nursing students going out to clinical environments should acquire.

As an added benefit, when understanding methods take precedent, more knowledge can be acquired via memorisation; more so than if memorisation methods were used in isolation. As Miran asserts, "*when I understand, memorisation naturally follows.*" Moreover, understanding as a knowledge building tool enables students to retain knowledge for a longer period of time; knowledge gained from memorisation is much

more transient:

> *Memorisation is transitory, but understanding makes for long-lasting information*. (Wanki, Nursing student)

4.3.3.3. Synthesising and Applying

Synthesising and applying of knowledge is the third stage of knowledge, as defined by the nursing students in this study. Such a process enables flexible thinking based on knowledge attained from memorisation and understanding, and requires active applications of such knowledge. For this stage of knowledge to be reached, prior knowledge attained from former stages plays a critical role in serving as the background or basic knowledge that is required for this stage. Thus, this stage of knowledge is dependent upon lower stages of knowledge and the previously discussed knowledge building mechanisms.

> *I think that memorisation or understanding must take precedent in order for synthesis and application to occur. The synthesis and application process will only be possible if there is memorisation and understanding.* (Hwashin, Nursing student)

As was mentioned in relation to the understanding process, understanding has the potential to expand knowledge. Based on such potential, this third stage of knowledge is reached by synthesising prior knowledge obtained from memorisation and understanding in such a way that expands pre-existing knowledge. Nursing students believe that knowledge expansion through the interconnections and synthesis of prior knowledge from memorisation and understanding facilitates an upper stage of quality knowledge. The two lower stages of knowledge are primarily concerned with

obtaining knowledge, whereas this stage of knowledge stresses the internal utility of prior knowledge. Therefore, based upon the nursing students' knowledge capacity, which has been accumulated via memorisation and understanding, their ability to synthesise and create knowledge at this stage will undoubtedly vary.

> *The ability to synthesise knowledge is at a higher stage on its own. Synthesising (knowledge) in itself is a great thing. If I do not have the ability to be able to pick out points of similarity, or lack creativity, I am unable to synthesise knowledge. I would only be able to explain information to patients when I have fully understood something. From there, if there is new knowledge, I combine it with my existing knowledge and it becomes of even higher quality…* (Yoonjin, Nursing student)

> *Let's say I add similar opinions, or obtain a relatively higher level of knowledge, or add the higher level of knowledge to existing knowledge, an even higher level of knowledge can be achieved. It is possible to change the level of knowledge. By synthesising pre-existing knowledge, or adding new knowledge to old knowledge, the level of knowledge can be promoted.* (Garam, Nursing student)

As is identified, prior knowledge and students' reflexive thinking are key to this knowledge building process. In particular, reflexive thinking plays a vital role in nursing students' education. The role of reflexive thinking in nursing education will be further discussed in the following chapter (Chapter Five).

> *A higher stage of knowledge is when I ask myself questions and then find the answers to those questions myself… I should reflect on my knowledge…* (Hyemin, Nursing student)

The intended outcome of knowledge synthesis is based on reflexive learning that would facilitate the flexible applications of knowledge to nursing practices in clinical contexts. Given that nursing is a practical field of study, active application of knowledge requires advanced and higher skills of thinking.

> *Memorisation is part of my own internal process. If I use the knowledge attained from memorisation on my patients, it is known as application. However, there are some students who cannot apply the knowledge they made so much effort to*

> *memorise during clinical placements. Therefore I think application [of knowledge] is something different [an ability]. There are students who always get good grades but have trouble applying their knowledge during placements. I don't think they have this [higher ability of knowledge application].* (Miran, Nursing student)

If nursing students lack the competency to apply their knowledge, which is presumably acquired previously during their education, one might expect them to experience difficulties in performing independent roles of nursing practice in a clinical context. Therefore, attaining a solid base of knowledge through memorisation and understanding, and subsequently developing the competencies required to apply that knowledge to nursing practice in clinical contexts – an essential educational objective in nursing education – makes up the third stage of knowledge.

4.3.3.4. Creating

Knowledge creation, which assumes the production of new knowledge, is the fourth and final stage identified by the nursing students in this study. In order to reach this stage of knowledge, the previously discussed knowledge building mechanisms should occur first. Descriptions of knowledge at this stage by nursing students are rare. It is assumed that the nursing students were restricted from reaching this stage of knowledge creation, as a result of the emphasis placed on memorisation stressed in Korean educational contexts. It was, however, identified as the highest stage of knowledge, exceeding that of the third stage, by two nursing students. Miran and Yoonjin both believe that knowledge creation is the highest form of knowledge:

> *If I mix and combine knowledge and then produce new knowledge, it is a higher stage of knowledge* (Miran, Nursing students).

> *[Knowledge] would be upgraded. I think if knowledge A is combined with knowledge B and then knowledge C is created, knowledge C should be the highest [form of knowledge].* (Yoonjin, Nursing student)

As the two nursing students indicate, the synthesis of knowledge (i.e., the third stage of knowledge) plays a vital role in creating new knowledge. Created knowledge is based on the individual nursing students' pre-existing knowledge and requires a greater capacity of critical thinking towards knowledge attained from memorisation, understanding, synthesis and application. It should be noted that not all knowledge that becomes synthesised automatically turns into new knowledge. Although this is a judgement call – whether knowledge classifies as new or not – and depends on an individual's subjectivity, the end result is to facilitate the sharing of new knowledge that is presented as information to others, and this information should be trustworthy, reasonable, logical and supported by empirical evidence. Thus the creators of new knowledge need be sensitive about whether something classifies as new knowledge or not.

Knowledge obtained via application and experience (from the third stage) can also present as a chance to create new knowledge.

> *For example, yesterday I observed an intravenous injection by a nurse. In my textbook, a standard taping method of the injection was suggested. However, the nurse said it is better to tape the fluid line with adhesive plaster at the upper side of intravenous injection, because it would not move about and patients would feel more comfortable. As this was something the nurse learned from her daily nursing practice, she taught us this new method… I think this is also a type of knowledge. The nurse was able to develop a new method.* (Dahee, Nursing student)

As Dahee demonstrates, new knowledge can be created via experience and through applying knowledge. For this knowledge creation to occur, individuals must first

ensure strong application skills.

4.4. An illustrative vignette

Here is an illustrative vignette, based on the interviews undertaken in this research. This vignette is used to exemplify the knowledge building process as it is proposed in this study.

	Knowledge building process
Today, Kuntaek, a 3rd year nursing student, visits an internal medicine ward in a hospital for his clinical placement. During the placement, Kuntaek gets nursing care information by observing one nurse's practice in caring for diabetes patients.	Connecting with information
It is lunchtime now, and time for his break. Kuntaek is allowed to view the EMR completed by the nurse. Kuntaek makes a memo of the patients' diabetes information from the EMR in order to further understand the nature of diabetes and the patients.	Connecting with information
As Kuntaek connects to the diabetes information, he becomes more interested in diabetes.	Deciding to accept information: Interests
In fact, Kuntaek recalls that he memorised some information about diabetes during his last midterm exam, but cannot remember the information very well.	Building knowledge: Memorising
Nonetheless, he is able to conjure a dim memory of the previously learnt knowledge about diabetes from his last exam, and connects this with the new information he has learnt during this placement. He wants to know more about diabetes.	Deciding to accept information: Frequency and Interests
Part of this interest stems from the fact that Kuntaek's father has diabetes. He therefore thinks that if he has the proper knowledge, he can utilise the skills and knowledge to help his father manage the condition.	Deciding to accept information: Interests and Utility
In addition, Kuntaek knows that diabetes is a hereditary disease, thus he is further inspired to learn about diabetes, so that he can also better care for himself.	Deciding to accept information: Necessity

Following his placement, Kuntaek returns home. He tries to recall his placement experience in reviewing the information,	Connecting with information
by reading the memo he wrote during his placement. Subsequently, Kuntaek opens a textbook about adult nursing and starts reading in order to obtain more information about diabetes	Connecting with information
Insofar as Kuntaek has former experience with diabetes, given the fact that he was required to memorise information about it previously, he is more apt to understand the information about diabetes presented in his textbook. Furthermore, given his keen interest in the disease, he is more willing and able to understand the information	Building knowledge: Understanding
By reading the textbook, Kuntaek is able to match the sources of diabetes information from the hospital and the textbook. As a result, Kuntaek feels that he is building practical knowledge about the disease	Building knowledge: Synthesising
After reading the textbook, he begins to wonder why information about diabetes medications is not fully explained in the textbooks	Deciding to accept information: Interests
Hence, Kuntaek decides to search the most widely used medications on the internet	Connecting with information
When he compares the information of diabetes pathology (learnt from the internet) to his textbook, he develops a much more in-depth understanding of the disease	Building knowledge: Synthesising
The following day, Kuntaek visits the ward again for his clinical placement. He participates in the education of diabetes patients based on the knowledge that he built yesterday at home	Building knowledge: Applying
The patients are pleased with the information they have received, and Kuntaek is well on his way to establishing himself as a qualified nurse.	

4.5. Conclusion

This chapter has explored the cognitive processes that nursing students engage in to build their nursing knowledge from nursing information. First, the nursing students provided their definitions of information versus knowledge and explained the relationship between the two. Differences between the two concepts hinge on the relationship of relativity and of ownership. Knowledge is presumed to be subjective

and inherent to one's mind, while information is non-subjective and exists outside of oneself, as a fact. Furthermore, knowledge is the consequence of one's internal processes dealing with information. This is a process of subjectification, wherein information is transformed into knowledge through a cognitive process consisting of complex factors and phases. This research divided these processes into three phases: connecting with information, deciding to accept information, and building knowledge. In particular, nursing students prefer to connect with text forms of nursing information (e.g. nursing textbooks), although other forms of information (e.g., visual, auditory and performing information) are also important. The reason for this is because they believe other forms of information are fundamentally based on the text forms and thus they prefer to go straight to the original source.

All of the information to which they connect does not directly become knowledge. Rather, a decision-making process based on five factors needs to take place. These factors are part of an individual and internal process of each nursing student and thus the decision-making process is comprised of many complex cognitive activities. This research has adopted dictionary definitions for clear divisions between the factors, after which, semantic meanings derived from interviews with nursing students were added to further nuance the definitions. The identified five factors, however, do not operate solely or individually, but rather, can interact with one another and be combined. When one factor combines with other factors, it reinforces the nursing students' motivation to build knowledge from information, which can be interpreted as a synergy effect. As Figure 8 demonstrates, the more correlations and intersections between the factors (i.e., getting closer to the core), the more motivation grows to build

knowledge. During the interviews, nursing students did not identify only one factor that influenced their decision-making process, but rather a plethora of factors that work together simultaneously. For example, as was evidenced previously in section *4.3.2.4. Utility of information*, Hyemin noted the important connection between that of necessity and utility. Following the decision-making process, some of the information will become knowledge. However, not all the knowledge is created at the same stage in terms of quality. Nursing students classify the knowledge quality into four stages: memorising – the lowest stage, understanding, synthesising and applying, and creating knowledge – the highest stage. These stages signify a sequence, wherein each stage is at least semi-dependent on the other, and where knowledge changes from the mere acquisition of information (i.e., memorising and understanding) to the production of new knowledge (i.e., synthesising and applying and creating). As was previously discussed, building knowledge is an internal process that requires learners to take an active role. However, there are different degrees of activeness, corresponding to the different stages of knowledge. Memorisation is the least active, due to the minimised involvement of one's subjectivity and reflexivity. As the involvement of subjectivity increases, learners become more active, moving from simple regurgitation of information (memorising) to creating brand new knowledge (creating). Moreover, the establishment of high quality knowledge increases when boosting the involvement of subjectivity, as learners are empowered to think critically and reflexively. As the involvement increase, learners also reinforce their ownership of knowledge, and the time that knowledge remains active in their minds is prolonged.

The three phases (connecting with information, deciding to accept information, and

building knowledge) do not occur in isolation, but run continuously and simultaneously, like three cogwheels, as is shown in Figure 7. For example, when the 'deciding to accept information' cogwheel runs, it influences both the connecting with information cogwheel and the building knowledge cogwheel. In a similar vein, when the building knowledge cogwheel runs, it also influences the connecting with information cogwheel. As was demonstrated in the fictional example story, new knowledge and previous experience can connect to form new information or knowledge, and vice versa. This means each stage in the process can activate other phases.

CHAPTER FIVE: KNOWLEDGE BUILDING DYNAMICS IN CLINICAL ENVIRONMENTS IN THE CONTEXT OF NURSING EDUCATION

5.1. Introduction

Nursing education aims to equip students with essential nursing knowledge and skills so as to develop the competencies required to practice as a nurse. As previously described, this education consists of both theory and practical education, and takes place within a university or in clinical contexts such as hospitals.

This chapter will explore nursing students' processes of learning in three contexts (i.e., in clinical environments, SBL in university laboratories, and classrooms in universities) where formal nursing education in Korea takes place. Moreover, the factors that influence the processes of learning will also be demonstrated in each of the following sections.

Firstly, nursing students' process of learning in real clinical environments in hospitals where they receive teaching and guidance from nurses will be discussed in detail. SBL carried out in university laboratories will then be reviewed, followed by classroom learning in universities. As this thesis focuses on nursing students' knowledge building dynamics with the use of ICT during clinical placements, this chapter will put more weight on demonstrating the learning in clinical contexts, as compared to the other two contexts within universities.

Following the identification of the three contexts, the mutual relationship between these three contexts with respect to nursing students' learning will be demonstrated.

5.2. Learning during clinical placements

Nursing students interviewed for this research, believe the main purpose of clinical placements in nursing studies is to adjust to the atmosphere of clinical contexts before becoming a nurse. During this adjustment, they can gain experiences of nursing practice, multidisciplinary team culture, and an opportunity to reflect on their knowledge of nursing theory.

> *The main purpose of clinical placements, prior to becoming a nurse, is to put into practice the theoretical concepts I have learnt [in classrooms], while personally observing and getting a feel [of real nursing processes and clinical environments]. Additionally, the clinical placements enable me to discover what I have an aptitude for, like where I should work [when I become a nurse] and which specialty I am suited for.* (Ari, Nursing student)

> *Clinical placements are for me to familiarise myself with clinical environment, and in preparation for working as a nurse, to gain indirect experiences [of nursing practice] and [experience] the nurses' hierarchical culture. [Moreover,] I can find out whether a specific ward is suitable for me or not… It was very useful for me to find out all these things through clinical placements.* (Yoonjin, Nursing student)

As nursing students mention their adjustment to clinical environments, it would be worthwhile to explore how they describe the environments first. Nursing students indicate that the clinical environments consist of complex characteristics and contexts. Sori, a nursing student, describes the moment when she enters a ward in a hospital as below:

> *When I visit [a ward] for my clinical placements, I can see a hallway in the ward. There are patients' rooms on either side of the hallway. In the middle of the hallway, there are nursing carts and nurses are charting medical records, preparing patients' medications in front of the carts, or going around the rooms. When I look to the left, I can find a nursing station and a charge nurse is sitting down and using a computer in the station. Other staff nurses are also charting medical records, using EMR or preparing patients' medicines in the station… After working in the station, the nurses rush out from the station [for patients' care].* (Sori, Nursing student)

Although Sori initially describes the ward where she undertakes her clinical placements as a serene place, the last sentence of her quotation indicates a change of the ward atmosphere as suddenly becoming urgent and dynamic. Other nursing students also describe the environments as a dynamic:

> *The atmosphere [in clinical environments] is pressing.* (Wanki, Nursing student)
>
> *The atmosphere of classrooms is too formal and stiff, while there is always movement in the clinical environments. Thus if I should describe the classrooms' atmosphere, I could say it is static, whereas the clinical contexts are dynamic.* (Kuntaek, Nursing student)

A reason for why they feel that the environments are dynamic would be because they believe the clinical contexts are unpredictable. This means that health professionals often face unexpected events while providing patient care, creating unpredictable and dynamic clinical contexts.

> *Clinical environments are unpredictable… Such as performing cardiopulmonary resuscitation [due to a patient's cardiac arrest] or caring for a patient who is experiencing sudden bleeding…* (Miran, Nursing student)

Another reason is the nurses' busyness. Nursing students assert that nurses look busy during their nursing practice, and this view that students have of the nurses also make them feel that the environments are dynamic.

> *When I go [to the clinical environment], everyone is busy… Nurses, nurse's aides and so on… Everybody looked busy.* (Wanki, Nursing student)
>
> *They are very busy. I did not know that being a nurse would be such a busy occupation… There is no one who is not busy in hospitals.* (Dahee, Nursing student)

As Dahee commented, nursing students find that nurses are busier than they expected when they enter the contexts for their clinical placements and observe the nurses working.

It is obvious that the purpose of clinical placements, an essential component of the nursing curriculum, is learning. Nursing students believe that part of that learning is their adjustment to dynamic clinical environments, which are busy and unpredictable for achieving their clinical practice competencies in the environments. During their education in these clinical contexts, there is a process of learning for the nursing students. In the following section, the process will be discussed.

5.2.1. Learning process of clinical placements

5.2.1.1. Nurses' general work process

Before exploring nursing students' processes of learning during clinical placements, it is important to first examine the qualified nurses' general work processes. This will help us understand the students' learning processes because they spend most of their time on clinical placements with nurses, who are their clinical instructors.

Nurses at tertiary general hospitals (see *2.4.1. Healthcare delivery systems in Korea*) in Seoul work in three shifts (i.e., day, evening and night shifts). Although several dissimilar tasks are given to the nurses during each shift, the pattern of nursing practice, such as priority of nursing tasks is largely similar.

> *There is a similar pattern of nursing practice every duty.* (Dahee, Nursing student)

For example, at the two tertiary general hospitals where the nursing students in this research do clinical placements, these two hospitals conduct team nursing and each nurse is allocated to a team for each shift. When a nurse goes on duty, the nurse reviews the EMR of patients assigned to the team before handover. When the handover starts,

a senior nurse from the former shift gives a general briefing on the events of which nurses in the incoming shift should be aware. Following this general handover, detailed one-to-one handover between a nurse on the incoming shift and a nurse on the outgoing shift is conducted for each assigned patient. After the detailed handover, the two nurses (i.e., outgoing and incoming shift nurses) complete a routine ward round together and then the nurse undertakes nursing practice pertinent to each shift's duties, such as checking vital signs (V/S) of the patients, preparing medications, surgical or medical procedures, writing medical records, managing doctors' prescriptions and conducting patients' physical examinations. When nursing students are allocated to a ward for their clinical placement, each student is assigned to a nurse in each team and, in theory, the nurses educate the nursing students during his/her shift.

Based on the above nurses' work process, nursing students' clinical placements are conducted in four stages, which are 'entering clinical environments', 'observing nursing practice', 'investigating nursing information', and 'undertaking nursing practice'.

5.2.1.2. Entering clinical environments (Entering)

When nursing students visit a hospital ward for their clinical placements, they first encounter the dynamic clinical contexts and begin to analyse the contexts as described above. Subsequently, the charge nurse or senior nurse of the ward orientates the nursing students to the ward, if it is the first day of their clinical placements. After the orientation, the students participate in both the general and the one-to-one nursing handovers. During these handover process, nursing students obtain information on

what is happening in the ward.

> *I firstly enter [a hospital ward] 10 minutes before the nursing handover. I can see [former shift] nurses trying to finish writing the EMR up for the preparation of the handover and the next shift nurses are reviewing the medical records in advance [before the handover]. In this atmosphere, we are just standing [around them]. When the handover starts, we also listen the handover from behind and take notes.* (Sori, Nursing student)

Before or after the handover on the first day of visiting the ward, the students are divided up amongst the nursing teams within which a nurse educates the students. The nursing students then belong to their allocated teams until the end of their clinical placements.

> *If there are A, B, C and D nursing teams, normally the charge nurse arranges a team for each student. Then, we are told by the charge nurse to shadow a nurse [in the team].* (Wanki, Nursing student)

While the nursing students' engagement in the handovers is extremely limited, they are allowed to observe the handovers. After the handovers, they are paired with an allocated nurse and begin their clinical placement activities in earnest.

5.2.1.3. Observing nursing practice (Observing)

During nursing students' clinical placements, their activities are mainly observations of what the clinical atmosphere is like and how nurses conduct nursing practice such as "*writing medical records, talking to patients, communicating with other staff and so on*" (Dahee, Nursing student). Thus, as the students spend most of their time on observation, they regard observation to be their main task during placements.

> *Just observe [nurses' practice] and learn… When I go [to the ward where I do*

> *clinical placements], we mostly observe [the practice] rather than do the practice.* (Eunju, Nursing student)
>
> *While following a nurse, I observe the nurse's practice from behind. Then I eat lunch. After lunch, I do observation again.* (Sori, Nursing student)
>
> *The meaning of clinical placements is to learn with my eyes the things that I have learnt through written language [in classroom at my university].* (Garam, Nursing student)

As the three nursing students indicate, it is revealed that their learning during clinical placements is focused more on observation than performing nursing practice. They value that the reason is because their position as a nursing student limits what they can do in clinical contexts:

> *We [i.e. nursing students] cannot play a leading role [during clinical placements], hence we only observe what nurses do.* (Yoonjin, Nursing student)
>
> *From a nursing student's point of view, clinical placements are for observation and learning.* (Dahee, Nursing student)

However, even student observation is sometimes rejected. This is related to the position of a student, and the nurses do not allow students to be completely involved in nursing care plans.

> *A nurse wanted to carry out her nursing duties and she knew I was following her. However, she drew the patient's bedside curtains as if to not allow me into the bedside area. So I hesitated whether I should go in or not. I think neither the nurses nor the patients consider us as medical professionals.* (Yoonjin, Nursing student)

Nursing students have feelings of ambivalence towards learning through observation. Although observation is helpful to learn nursing, they express feelings of a lack of learning due to the limited practice.

Positive aspects:

> *I can review my knowledge, and further that knowledge through observation.* (Wanki, Nursing student)
>
> *Observation plays a role in arousing my interest and curiosity [of nursing knowledge]*. (Hyemin, Nursing student)

Negative aspects:

> *When I only observe without practice, it is not interesting.* (Bora, Nursing student)
>
> *I can't remember the knowledge from observations well. This is because there is no active doing.* (Yoonjin, Nursing student)

Nursing students understand and recognise that they cannot play a leading role in nursing practice due to their position as nursing students (the issue of position will be discussed in detail in *5.2.2.2.2. Social hierarchy and discipline* as a student). In this situation, they learn mainly by observing nurses' practice (i.e. by indirect experiences of nursing practice). They indicate that this educational approach of observation can be useful for their learning but they desire to undertake nursing practice themselves.

5.2.1.4. Investigating nursing information (Investigating)

Nursing students investigate patients' information via medical records during clinical placements. Through this investigation, they can understand the patients' medical histories and diseases, and collect the patients' medical information for a case report, given as an assignment by their university. Nursing students have to submit the case report to their respective universities during or after their clinical placements. This investigation process is one of the processes on which nursing students spend much

time, following the observation process.

> *The second thing on which I spend many hours during clinical placements is reading the EMR, namely, reading patient information. It is for my case report assignment. I read the patients' medical history, lab results and so on.* (Wanki, Nursing student)

> *I read nursing records a lot, because I don't really know [about nursing practice that take place in a ward] during the first visit to the ward. For example, I read a patient's V/S record and found that the patient had high fever continuously, like 39 °C, on 5th June. When I read other nursing records [of the patient] on the date, the record shows what nursing practice the nurse had performed [for caring high fever]. Hence, I understand when I can apply tepid massage, how to do the massage, how often, and so on.* (Hwashin, Nursing student)

As Hwashin explains, nursing students who visit an unfamiliar clinical environment can understand what is happening in the environment, particularly in terms of nursing practice, by investigating medical records that include nursing information. Although the records are in written form, the records contain descriptions of applied nursing practice in real clinical environments, thus it aids in understanding nursing practice and the contexts for its application. Moreover, the information from medical records is helpful in building and/or expanding the students' nursing knowledge:

> *Investigating medical records is for building my nursing knowledge.* (Sua, Nursing student)

The process of investigating medical records for their assignment (i.e., the case report) is outlined below by Yoonjin.

> *Firstly, I have to decide on a patient. This decision is made either by the nursing student, a charge nurse or a university lecturer. After the decision is made, I try to understand the general history of the patient on the first day. Next, I write down all of the patient's information from the EMR. When I go back home, I review my notes. During this review, I check the patient's disease and study the disease and its symptoms. Following this, I see the patient again, check whether the symptoms are really happening to the patient and try to work out the nursing diagnosis in my mind. I reflect these activities on my case report. Then I present my case report in*

> *a conference. One day before the presentation, I review the patient's medical tests, treatments, and so on, once again. An average of 6~8 nursing students gather together and a university lecturer orders us to present each case report one by one… During the presentation, I firstly present the literature review related to the patient's disease, its treatment and the course of pre and post-operative management. I then present the patient's general information as well as the nursing care that the patient received such as medication, surgery, and so on.* (Yoonjin, Nursing student)

Dahee, who is a nursing student from a different university to Yoonjin, also reports a similar process of the case presentation:

> *Even though a university lecturer gives me a format for the case report, I have to know all about the patient [whom I have chosen for the case report]. I have to read all of the patient's EMR. However, I can't read everything about the patient due to the significant amount of information. Hence, I need to decide on what kind of information I will look up in the EMR. Firstly, I start to write down all of the patient's medical examinations… Based on the examination results and the patient's condition, I prepare [to decide on] nursing diagnoses and also collect the patient's subjective data. I present the report after organising and integrating the information. During the presentation, I present only the important information [about the patient]… and conclude my presentation with the nursing diagnosis on which I have decided.* (Dahee, Nursing student)

Through investigation of patients' EMR, nursing students are able to obtain patients' information, build knowledge about the disease and relevant nursing management. This allows them to better understand nursing and patient management within a clinical context. In addition, this process of investigation is crucial in order to complete assignments given to nursing students during clinical placements.

5.2.1.5. Undertaking nursing practice (Practicing)

To undertake nursing practice would be one of the valuable experiences for nursing students adjusting to clinical contexts and for developing their competencies in nursing

practice. During clinical placements, nursing students usually have a chance to experience engaging in nursing practice.

> *Sometimes, I am asked to do nursing practice by nurses, like, "You can try it". At this time, I can do nursing practice under the nurses' supervision.* (Dahee, Nursing student)

However, the nursing practice that students can undertake is limited and they are allowed to perform only relatively simple and repetitive tasks such as measuring patients' V/S and blood sugars, and emptying patients' urine bags. In particular, measuring patients' V/S is the main nursing task that nursing students can independently do.

> *I've got to continuously check patients' V/S [during clinical placements] and depending on the department, I also conduct blood sugar tests and empty patients' urine bags.* (Yoonjin, Nursing student)

> *The most basic thing I do is measure V/S. I also change patients' clothes, empty their urine bags, refill empty nursing carts, cut plasters and so on…* (Sori, Nursing student)

It is also verified through nurses' interviews that the nurses conduct the students' education in ways similar to the students' descriptions.

> *During the first day of the students' placements, we arrange the students with a team… The students need to follow the team nurses and the team nurses show the students their nursing practice… As I understand, they have to complete a case report and need the patients' information, so I log in a computer and allow the students to use the computer.* (Sukjin, Nurse)

> *First of all, we don't give them many tasks… On the first day, the charge nurse give them an orientation for around 30 minutes… and then the students are assigned to each nurse in a team. After this, they can observe the nurses' practice. I usually give them very simple tasks such as fundamental nursing tasks including checking V/S, which are not invasive… They mostly conduct observation [of nurses' practice].* (Hansol, Nurse)

> *When the students visit my ward, they observe our general nursing handover, and then the one-to-one nursing handover. After the patient review, we do our*

> *individual tasks. We give a general introduction of our ward. Then we check the patients' V/S. If there is time, the students can ask questions. When the students complete the V/S checking and observations, they read the EMR or meet the patients. The thing that the students mostly conduct is observation.* (Nayoon, Nurse)

There are several reasons as to why nursing students undertake little clinical practice during clinical placements, which will be debated in detail in the following section of influential factors (see *5.2.2. Influential factors on learning in clinical contexts*).

As nursing students believe that the main purpose of clinical placements is to adjust to clinical contexts, they make their adjustment through a physical process consisting of four stages. It is identified that nursing students who enter unpredictable and busy clinical environments (i.e. 'entering') also go through the complex and situational stages of 'observing', 'investigating' and 'practicing' for their clinical placement learning. Amongst these stages, the students spend the most time in the stage of observing. Sori, a nursing student, describes herself as an '*observer*' during clinical placement education. They also spend many hours investigating patients' information using the EMR to understand the patients' medical conditions or to undertake case report assignments. They have opportunities to engage in clinical nursing practice during placements as well, although this is limited.

These stages are not activated by a rigid step-by-step forward process, but each stage is operated by situations within the clinical contexts due to the unpredictability of clinical environments.

Through the four stages of the learning process, nursing students also undergo a cognitive process of reflection on their prior knowledge during their clinical placements. This process is differentiated from the physical process of four stages and

this reflection will be discussed in a later section (see *5.5.4. Reflection and existing knowledge*).

5.2.2. Influential factors on learning in clinical contexts

The nursing students who participated in this research believed that six factors (i.e., interpersonal, socio-cultural, instructional, environmental, emotional and physical factors) influence their clinical placements. The six factors, which are related to each other via causal and complex relationships, have an effect on the learning process discussed above. These six factors can be categorised into two categories, which are contextual and individual factors. The contextual factors consist of the first four factors (i.e., interpersonal, socio-cultural, instructional, environmental factors), whereas the individual factors consist of the latter two factors (i.e., emotional and physical factors). The contextual factors focus on external elements that influence the nursing students' learning, while the individual factors deal with the students' internal mechanisms as they are affected by the contextual factors.

This section will explore the causative contexts towards each factor, and then discuss the nursing students' responses to the contexts. Subsequently, the impact of the students' responses on their learning in clinical contexts will be critically discussed.

5.2.2.1. Being influenced by interpersonal factors (Factor 1: Interpersonal factors)

During clinical placements, nursing students mainly interact with three groups of people who can influence their learning. The groups consist of nurses, university lecturers and patients, with the nurse group affecting the students' learning the most.

> *The most influential person is the nurse who works the same shift as me.* (Kuntaek, Nursing student)

The reason why nurses are the most influential people to the nursing students is that they spend most of their time with them during clinical placements.

> *In clinical environments, nurses influence my learning the most. This is because we continuously stand beside the nurses while observing [nurses' practice] and following them around so that we can learn.* (Sori, Nursing student)

Another reason is that nursing students have a strong faith in nurses. They believe that nurses would play a critical role in helping them build their nursing knowledge through clinical experiences with the nurses.

> *What I can remember after clinical placements is that my learning experiences are from my clinical experiences with nurses.* (Dahee, Nursing student)
>
> *I believe that nurses influence my knowledge-building in nursing studies, more so than patients.* (Yoonjin, Nursing student)

Although nursing students believe that nurses are important and influential people during their clinical placements, nurses are busy, as discussed earlier, and thus have limited time to take care of nursing students in the busy clinical contexts.

> *My education during clinical placements is affected by atmosphere of the ward I visit that day. If the nurses have a heavy workload, they can't take care of us… because they are busy… they can't explain much to us.* (Hwashin, Nursing student)

> *Most nurses don't take care of us because they are busy. So they leave us alone [in clinical environments].* (Sua, Nursing student)

The reason why they are busy will be dealt with in detail in *5.2.2.4. Environmental factors*.

Moreover, nurses' attitudes towards student education during clinical placements vary, and these different attitudes influence the students' learning.

> *In my experience, each nurse has unique attitudes. Depending on the nurses' attitudes towards their work and our education, it can be so different. Sometimes, even in a very busy and challenging ward, there can be a nurse who is enthusiastic, professional and kind, so much so that I see her as a role model from whom I have much to learn. On the other hand, there can be another nurse who is so worn out to the point that I think, "I don't know why the nurse is here if she is going to work like this" or "I don't know why she is working as a nurse". Therefore, it is different from nurse to nurse.* (Ari, Nursing student)

> *There are nurses who take care of us and nurses who ignore us in clinical environments. Amongst the nurses who take care of us, there are nurses who explain things to us occasionally or nurses who explain everything to us, from start to end, which is rare.* (Bora, Nursing student)

Levels of rapport between nurses and nursing students also influence the students' learning in clinical environments. If the students have higher levels of rapport with the nurses during clinical placements, they have more opportunities of receiving education from the nurses than the students who have lower levels of rapport with the nurses.

> *If I have a good rapport with the nurses, I can ask any questions immediately and the nurses will explain in detail. So, they help me to build more nursing knowledge. However, if I don't have good rapport with the nurses, the nurses don't answer my questions and tell me to study on my own and come back with the answers, as if they are angry with me.* (Garam, Nursing student)

Meanwhile, nurses in this research described having negative attitudes towards the students' education in clinical contexts, regarding is as burdensome. This is because

the students' clinical education causes an increase in their workload.

> *[Under normal circumstances,] I am only required to take care of my assigned patients. [But when the students come to my ward,] I also have to take care of them and educate them. It is really difficult, because then I have to keep talking.* (Hansol, Nurse)

> *Clinical placements are a burden itself. When the students come to us, it seems as if we have to keep taking care of them, and play an extra role… The students always have to follow one of the nurses and we constantly have to keep our eyes on them. When the students observe our nursing practice, it is burdensome because we feel like we are being supervised. Moreover, we have to spare time for them.* (Sunja, Nurse)

> *I feel burdened. First of all, I am busy enough just trying to complete my own work. But [if nursing students visit our ward], I have to take the student around and educate him or her. Honestly, it is time-consuming. So it is burdensome. Moreover, just someone watching my practice is a burden itself. I don't like it.* (Sukjin, Nurse)

Furthermore, it is evident that nursing students' clinical education is of lower priority to the nurses who participated in this research, and these nurses believe that teaching is not one of their official duties while working.

> *I am not a nurse educator. I get a salary from my hospital for caring patients, not for educating the students. I am not in charge of [the students'] education. It is not my duty. So I believe that educating the students is not my priority… You know, I can't be educating the students while patients' conditions are getting worse…* (Hansol, Nurse)

> *Educating the nursing students is not our official duty.* (Sukjin, Nurse)

Other than the nurses, university lecturers are also indicated as influential persons on the nursing students' learning during clinical placements.

> *University lecturers supervise our clinical placements in general. They offer the guidelines for the placements. In addition, they sometimes visit us in clinical environments and summarise the things we should learn in each ward. So, they are influential.* (Garam, Nursing student)

The main reason for the nursing students to assert that university lecturers are

influential people on their clinical placement learning is due to the lack of training by the nurses. Within the busy clinical contexts, they believe that the lecturers can make up for that lack of learning.

> *Based on all my educational experiences in clinical environments, I should say university lecturers are more influential than nurses. This is because, even though I spend the most time with nurses, they do not have the same affection for our education as much as our university lecturers.* (Hyemin, Nursing student)

It is also evident that the students have a high level of rapport with university lecturers more than with the nurses. The reasons for this would be that the students are more familiar with the lecturers they see frequently when they attend classes at the university, and would have had more opportunities to build closer relationships with university lecturers. They also feel that as the university lecturers' main role is to educate, they would be able to ask questions of them more freely.

> *When I ask questions, university lecturers kindly answer all my questions and they take care of us like their own children.* (Sori, Nursing student)

Meanwhile, to supervise the students in clinical environments, the lecturers stay in the students' clinical placement sites for a limited amount of time. For example, in one nursing school, when the students undertake clinical placements for one or two weeks in a clinical ward, a university lecturer would visit the placement site once or twice, for about an hour each time. In comparison with the nurses, the lecturers spend much less time with the students during clinical placements, but due to the lack of teaching from the nurses, some students would find the lecturers to be more influential for their learning.

The last group of people that influences the nursing students' learning during clinical

placements is the patient group. It has been verified that nursing students learn about the therapeutic relationship between patients and nursing professionals through patient interaction during clinical placements, rather than through formal academic knowledge. In addition, they are inspired to think about the caring roles nurses take on via the relationship.

> *I obviously learn a lot from nurses, but I can also learn a lot from patients through interacting with them. Because, no matter how much [nursing] knowledge I have, if I don't know how to interact with patients, I will shrink away from them, and I think that is wrong. In my case, I had opportunities to spend a lot of time with patients during a clinical placement. For this reason, I became so attached to the patients during those two weeks. So, I cried when I finished the placement. Even if I could learn nursing knowledge from nurses, I felt I could learn about life from the patients. In other words, I feel I can learn how I should offer nursing care not only through watching the nurses, but also through talking to the patients.* (Ari, Nursing student)

> *Patients are also influential. There are many patients who have pitiable life stories… I had an experience to visit a ward for patients with burns. In the ward, my heart ached when I saw a child who had burns all over his body and he cried himself to sleep. I also saw a patient who was in the terminal stage of cancer. I was told that all medical staff had given up on caring for him. However, he always took walks with his wife while grabbing his wife's hand tightly… I did not feel quite like a nurse during my first and second years as a nursing student, but when I see patients like that, I think about what more I can do for them as a nurse. Clinical placements were good opportunities to understand the patients.* (Dahee, Nursing student)

As above, nursing students indicated they feel emotional affection such as sympathy and love for the patients they meet during clinical placements. Thus, based on that affection, they are motivated to learn how nurses can take care of patients within a therapeutic relationship. Moreover, they are able to learn about diseases from patients' real experiences, which they cannot learn from nursing textbooks and clinical education from nurses.

> *This is because patients show actual clinical signs of diseases in front of me.*

(Yoonjin, Nursing student)

However, nursing students are restricted in developing these emotional and therapeutic relationships with patients during their clinical placements due to their heavy assignment workloads and limitations to their nursing practice.

I have a heavy workload during clinical placements such as conferences and assignments. Sometime I am confused whether I am here [i.e., clinical environments] to see patients or to do assignments. I think we should have more chances to meet and experience more patients by reducing the time taken up by doing assignments. (Ari, Nursing student)

These limitations will be demonstrated in the following sections.

5.2.2.2. Being influenced by socio-cultural factors (Factor 2: Socio-cultural factors)

Nursing students' learning in clinical environments is affected by socio-cultural factors. As Korean nursing students were recruited for this study, these factors were identified to be significantly involved with their learning in clinical environments. It would be impossible to cover all socio-cultural factors in this study, but several key components related to the nursing students' learning will be addressed.

5.2.2.2.1. Ppalli-ppalli culture in Korea

Korea has a distinguished culture that is reflected in one word. Koreans should be 'ppalli-ppalli'. (Yoonjin, Nursing student)

First of all, Koreans generally value the ability to do something quickly and use the

word of ‘ppalli- ppalli’ frequently during communication with others. The Korean word of ‘ppalli-ppalli’ literally translates to ‘hurry-hurry’ or ‘quick-quick’ in English. During the interviews, nursing students also use the word often when they describe their experience of clinical placements, life and using ICT. For example:

> *Nurses do their work really ppalli-ppalli (quickly- quickly).* (Sori, Nursing student)
>
> *I decided to join a nursing school because I can get a job ppalli (quickly).* (Eunju, Nursing student)
>
> *I can obtain information ppalli (quickly) [when I use ICT].* (Bora, Nursing student)

Moreover, the nursing students describe having positive attitudes towards speediness and understand the value of doing things fast in Korea.

> *There is definitely good points about doing something fast.... If I complete something ppalli, I gain extra time for myself and I can do other things during that extra time. That is why I try to do something ppalli- ppalli.* (Miran, Nursing student)

As Miran points out, the reason for doing something fast is to earn extra time to do other things. It demonstrates that they want to utilise their own time effectively. The belief of an effective use of time by doing something quickly is deeply embedded in the Korean socio-cultural atmosphere.

> *Ppalli-ppalli is a basic foundation [of our culture] in our social life. It stretches over our whole society. So, if someone is unhurried, it looks weird… I think our society creates that atmosphere. From early childhood, [we have been told that] “eat ppalli”, “put on clothes ppalli” and so on. When we do things ppalli-ppalli, we are praised more. Ah, we also have the fastest internet [in the world]. If it becomes slow, it is unbearable for us. This is because we grew up in this atmosphere.* (Yoonjin, Nursing student)

According to Yoonjin, it is identified that the Korean society pushing people to do things quickly has become a socio-cultural imperative. Moreover, they take the fast-paced atmosphere for granted and are familiar with the atmosphere.

This socio-cultural imperative can also be reflected in the clinical context, as Miran asserts:

> *Nobody likes anything done slowly and we will get scolded if we don't do it ppalli… So, we can't walk in hospital, but we have to always run…* (Miran, Nursing student)

> *When I measure patients' V/S during clinical placements, nurses push and complain for us to check the V/S ppalli… That is why I have to organise my time in advance and do it ppalli. Both the clinical and social atmospheres are similar, it is like always being chased.* (Yoonjin, Nursing student)

As is discussed earlier, nursing students believe that nurses always look busy in clinical environments. The reason for appearing busy can be understood more clearly in this socio-cultural atmosphere.

Furthermore, the value of speediness is shown to be more advantageous in the information technology age. In particular, Korea is a country that has advanced ICT infrastructures all over the country and is a leader in the global ICT market. In this ICT-friendly society, nursing students also put great value on rapid acquisition of information using ICT and they believe that they should respond as quickly as the speed of ICT development.

> *I can get information ppalli [through ICT]… So, I feel that I should mentally prepare myself to do things ppalli.* (Hyemin, Nursing student)

> *ICT has greatly developed for us to do things quicker and more accurately. Rather than developing just for the purpose of doing things quickly, I believe that we simply became faster [at doing things] as ICT developed.* (Miran, Nursing student)

In this fast-paced Korean society, nursing students indicate that their temper has quickened as Ari and Miran assert:

> *I have a very impatient personality… but I feel I should be faster due to ICT development. However, I am worried that I may make a big mistake in clinical environments one day or another because of my short temper.* (Ari, Nursing

student)

> *As I have lived amidst that cultural context, I think my character has become quicker over time. For example, when I used a printer in the past, I didn't care about its printing speed because I understood it was slow. Whereas, when I use an old printer in my school now, it drives me crazy due to its slow speed. This is because I have become used to my new fast printer at home.* (Miran, Nursing student)

Meanwhile, Yoonjin's quotation indicates a deeper explanation to understand this socio-cultural situation:

> *We should do a lot of work within a short time… Even though it is a tough thing for me, our society can have a chance to develop more… Moreover, our country doesn't have enough natural resources. That is why the human workforce is one of our important resources. Hence we should develop our society ppalli-ppalli using the workforce.* (Yoonjin, Nursing student)

From Yoonjin's quotation, it is evident that Yoonjin thinks about the community she engages with. She believes that the development of her society is of greater priority than that of her individual hardship. This can be explained by the theory of collectivism in Asian countries. The nature of collectivism will be frequently dealt with later in this research.

5.2.2.2.2. Social hierarchy and discipline as a student

Korean society, which is based on Confucianism, has a culture of hierarchical organisation. Social positions such as age, job titles and work experiences within an organisation determine the interpersonal relationships, and that relationship is vertical.

> *The relationship between juniors and seniors is very unilateral indeed. The seniors always have his/her own way in dealing with the juniors, but the juniors cannot express their bad mood to the seniors. This situation does not apply only to nurses, but rather, applies across the Korean society.* (Miran, Nursing student)

> *I think it is the relationship between 'gab' and 'eul'. When I am in the position of 'gab', I am not cautious of others who are in the position of 'eul', such as my juniors. However, when I am [in the position of] 'eul', I have to obey those in the position of 'gab' and do what they want.* (Hyemin, Nursing student)
>
> *In Korean society, all members of the society are not equal. It becomes power when one is older, in a higher position than others, and so on…* (Sarang, Nursing student)

'Gab' and 'eul', as mentioned by Hyemin, are unique Korean words. Koreans recently use these words in many cases when they talk about power in a relationship between two persons or groups. The person in the position of 'gab' generally has more power or authority than the one in the position of 'eul', who is in the subordinate position, such as the relationship between an employer and an employee, a prison officer and a prisoner, or a teacher and a student.

Clinical environments are workplaces where diverse expert groups work together and each group consists of experts who have various work experiences. Nursing students with experience in the clinical environments emphasise the vertical relationship that exists between different groups (e.g., doctors and nurses) or within the groups (e.g., a charge nurse and a staff nurse). The vertical relationship (i.e. hierarchy) is particularly noticeable within nurse groups as Hyemin points out:

> *Although other work fields have a social hierarchy, hierarchy within the nurse groups is more severe than what most people think. The relationship between superiors and subordinates is clearly distinguished and there is strong discipline that the junior should comply with. Junior nurses are always 'eul', compared to senior nurses, as well as patients and doctors.* (Hyemin, Nursing student)
>
> *During clinical placements in a ward, I had a question but there were no staff nurses around me. So I asked the charge nurse of the ward my question and then I was scolded. The charge nurse told me, "Why didn't you ask the staff nurses first?" and "Why did you ask me directly?" However, I know not all charge nurses say it like that.* (Eunju, Nursing student)

According to Eunju's quotations, it is identified that the vertical relationship exists between nursing students, staff nurses and charge nurses. The nursing students should contact the charge nurse only through the staff nurses and it can be assumed that nursing students take the lowest position in the relationship.

> *I am not the nurses' colleague yet and I'm the low man on the totem pole. Due to [our] society's traditional culture, the vertical ranking order and the relationship between the higher and lower-ranked, we have to be careful of our behaviours.* (Sarang, Nursing student)
>
> *Yes, we are the lowest rung on the ladder. Students are always 'eul' [in the 'gab' and 'eul' relationship]. We have to be careful of our behaviour in clinical environments, because it is a way to maintain the relationship between the hospitals and our school.* (Garam, Nursing student)
>
> *Nursing students are at the bottom if nurses are at the top in the vertical relationship… I think we are [like] servants who learn once in a while [in clinical environments]? In all situations, we shouldn't step forward to lead, and we should accept all requests from the nurses and immediately get to work on it first, even if we were in the middle of doing something else. All priorities are given to the nurses rather than to us.* (Yoonjin, Nursing student)

Moreover, nursing students assert that the hierarchical relationship is presented and maintained during their learning process. This means they are inhibited in their learning in clinical contexts.

> *The relationship between workers and learners in a hospital is that of 'gab' and 'eul'. When nursing students go on clinical placements as learners, they are 'eul', the lower-ranked.* (Yoonjin, Nursing student)
>
> *I feel that we are the weak ones when trying to learn nursing knowledge [in clinical environments]. Nurses communicate with us one-sidedly [because we are the weak].* (Dahee, Nursing student)
>
> *[When I have a question,] I would first ask other students. If they don't know, I search [for the answer] the internet using my smartphone when I can use it. If I still can't get my answer, I eventually ask the nurses.* (Sori, Nursing student)

As discussed above, nursing students believe that they are in the lowest social position as a learner in the nursing hierarchical relationship in clinical environments. Based on

this hierarchical relationship, strict discipline is imposed on nursing students during their clinical placements.

> *Discipline within the nursing community is strict, like the military… [For example,] nursing students shouldn't talk in hospital elevators, and we shouldn't eat while walking… From the way we are told, I think nurses would want us to not do anything except nursing when we wear a nursing uniform. We are also not allowed to bring or use our mobile phone during clinical placements.* (Miran, Nursing student)

> *There are invisible rules that nursing students should obey in school and during clinical placements. For example, we can't use mobile phones [during clinical placements].* (Kuntaek, Nursing student)

> *Nobody tells us that we should maintain proper attitudes and participate in clinical placements sincerely, but we cannot act otherwise. Nobody tells us, "Go see that" or "Now try doing this". We need to be told before we can touch [the patients], so it would mean that we shouldn't do anything without the nurses. We need to get their permission [first].* (Ari, Nursing student)

As above, Ari mentions 'proper attitudes', which the nurses expect the students to have during the placements, believing it is a custom in Korea.

> *We [ourselves] have learnt! Students should always have proper attitudes and be enthusiastic… I think it is a custom. We have a stereotypical way of thinking, like "Students shouldn't do that".* (Hansol, Nurse)

It should be noted that the vertical relationship and discipline are not formally taught, but that nursing students should instinctively know to obey these. If they contravene the relationship and discipline, either the nurses or university lecturers would immediately scold them.

> *I will be definitely scolded by the nurses, as well as university lecturers …* (Yoonjin, Nursing student)

5.2.2.2.3. School ties

In this research, while exploring the relationship between nurses and nursing students and the influences of that relationship on students' learning during clinical placements, a unique interpersonal relationship was discovered. This relationship is that of school ties. School ties denotes the bonds between the nursing students and the nurses who graduated from the same nursing school as the students.

> *Hospital culture has an influence on student education. For example, with my clinical placements, I can divide the experience into two cases, the ABC hospital, which is the university hospital for my school, versus other hospitals. Many nurses who graduated from the same university as me work at the ABC hospital hence they would surely offer proper nursing education to us. They impart nursing knowledge and explain diseases well, but, the other hospitals don't educate us like the ABC hospital. The other hospitals make us to do very simple tasks from which we don't get any nursing knowledge, but the ABC hospital doesn't do that. The nurses at the ABC hospital give us many opportunities to do nursing practice.* (Miran, Nursing student)

> *There are some differences… When I visit a hospital where many nurses who graduated from my nursing school are working, they sometimes tell me "I am your senior". They educate us more than other nurses. The others are indifferent to our education.* (Hwashin, Nursing student)

> *The nurses who graduated from other nursing schools don't teach me much.* (Sua, Nursing student)

As is indicated in Miran's quotation, when nursing students undertake clinical placements in their university hospital, they have more chances to receive nursing education than in other hospitals, due to the high proportion of nurses who graduated from the same school working in the university hospital. As the students experience stronger school ties with the nurses, they tend to take care of the students more. The nurses also offer more opportunities to the students to experience nursing practice, although the nurses are already busy with their work.

> *I was given chances to do nursing practice such as urinary catheter insertion, intramuscular injection, antibiotic skin testing, intravenous medication and so on. My friend even had an experience to do intravenous injection. I think I can have many chances to do nursing practice [through the nurses who graduated from my university].* (Hwashin, Nursing student)
>
> *The nurses think I will work at the same university hospital and use the same equipment when I graduate, therefore they would want to educate us more in advance.* (Miran, Nursing student)
>
> *If I know the students will be working at our university hospital, my teaching methods change. Because they will be the persons I will be working with. Moreover, I tend to teach better when I educate the students from my university. I think this would be because I think there is a higher possibility for them to come work here. They are potential insiders… I know it is favouritism, but it can't be helped.* (Hansol, Nurse)

It should not be interpreted that the concept of school ties exists only in Korean culture. However, the relationship based on school ties is significant in Korean culture and nursing students understand the relationship as one of the characteristics of Korean culture.

> *[I am educated more, because] I am from the same nursing school. Koreans think school ties are impossible to ignore in Korean relationships.* (Sua, Nursing student)

The relationship of school ties can be interpreted using the concept of belongingness. Rapport can be established quickly between different individuals when they identify themselves to belong to the same group, which in this case is the university where one receives his/her nursing education. Based on the sense of belongingness brought on by school ties, the rapport established between nurse and nursing student gives rise to better provision of learning opportunities for the student. It means that school ties play a vital role in both reinforcing the rapport in the interpersonal relationship and influencing the students' learning during clinical placements.

5.2.2.3. Being influenced by instructional factors (Factor 3: Instructional factors)

In this section, components that influence instructional methods in nursing education during clinical placements will be discussed. As discussed in the above sections, nurses lead nursing students' education during clinical placements and the students proceed with their learning through four key processes. In particular, the students understand the process of observation as a major instructional method open to the students during their placements (see *5.2.1. Learning process of clinical placements*).

> *We go to the hospital for observation.* (Sori, Nursing student)

Nurses also believe that one of the students' duties for their learning in clinical environments is observation.

> *What the nursing students can mostly do is observation.* (Sunja, Nurse)
>
> *Nursing students mostly observe.* (Sukjin, Nurse)
>
> *When nursing students visit our hospital for clinical placements, they are told to observe as much as they can.* (Nayoon, Nurse)

Based on these contexts of education in clinical environments, each nursing student conducts their learning process to build on their knowledge, but they indicated that there is a lack of standard guidelines for nursing education during clinical placements at different hospitals and this causes confusion about their education.

> *Educational methods are different between hospitals.* (Ari and Bora, Nursing students)
>
> *Each hospital educates us differently… But it seems like the overall atmosphere at all hospitals is that it is hard to give much attention to our education.* (Yoonjin, Nursing student)

Moreover, the students are also confused due to nurses' varying attitudes as discussed in earlier section (see *5.2.2.1. Interpersonal factors*) and the lack of the consistency between nurses for teaching.

> *For example, I followed a nurse [during clinical placements]. This nurse told me "I will write medical records using this computer, so you can use another computer for reading medical records". So I used another computer for that purpose. Then, another nurse came and told me, "Why are you sitting here? You should follow a nurse who is* undertaking *nursing practice". I was confused.* (Sori, Nursing student)
>
> *Nurses are inconsistent with their teaching.* (Bora, Nursing student)
>
> *As [educating students] requires a human touch, instructional methods used in nursing education are therefore variable.* (Wanki, Nursing student)

As the above nursing students point out, students struggle with learning in clinical environments due to the lack of standardised instructional guidelines for nurses. For this, Dahee hopes nurses can have standardised guidelines to adhere to for nursing education in clinical environments, as below:

> *I think there is a strong need to have a standard guideline for nursing education during clinical placements, because there is no consistency [for nursing education].* (Dahee, Nursing student)

Nurses also admit there are no detailed guidelines for nursing education during clinical placements

> *In fact, we don't have any guidelines on how to supervise nursing students in this hospital.* (Sunja, Nurse)
>
> *We have an organised manual for training new nurses and we just need to educate them as scheduled… However, a student's clinical education is completely entrusted to the assigned nurse, and there are no detailed guidelines.* (Sukjin, Nurse)

Another component related to the instructional methods is the period of time spent on

each clinical placement. Nursing students believe that the length of time spent in one place influences their learning during placements. Nursing students usually stay in one hospital ward during clinical placements for a minimum of one week, and a maximum of two weeks.

> *We mostly move to another ward every two weeks*. (Hwashin, Nursing student)
>
> *I spend a week at one hospital for each of my clinical placements, so sometimes I learn only the basics.* (Wanki, Nursing student)
>
> *Nursing students can experience their placements in various places during 24 weeks as they stay at each place for a week. But, I know it also has a disadvantage. Because they only stay at each place for a week, they move to another place before they can adjust and learn.* (Jongwon, Lecturer)

However, the students assert that a period of one to two weeks in a ward is inadequate and these short periods have a negative effect on their learning.

> *I think to move to another ward every one or two weeks for clinical placements is too short a time. It is really hard to adjust to each ward within that short period of time. Just when I start to feel that the nurses and I are getting closer*, *the clinical placements end.* (Yoonjin, Nursing student)
>
> *I have to visit several wards within a short period of time during my clinical placements, so I feel like I'm just passing through and don't learn much about each ward. And because we leave within a week, the nurses do not make much effort to educate us.* (Dahee, Nursing student)

As Yoonjin indicates, the clinical placement periods are related to the rapport between nurses and nursing students, and this rapport positively influences the students' learning during clinical placements, as argued earlier (see *5.2.2.1. Interpersonal factors*). However, due to the short periods of time, the students have difficulty in building good rapport with nurses, who are the most influential persons to their learning in clinical environments. Furthermore, short placement periods potentially disturb the students' adjustment to clinical contexts, which is the purpose of clinical

placements (see *5.2. Learning during clinical placements*), and subsequently hinder their learning during clinical placements.

Another component of instructional issues is the heavy assignment workload given to nursing students. The students currently feel a burden with regards to the amount of tasks and assignments they have to complete while on clinical placements.

> *I spend most of my day at clinical placement, and the rest of the time completing assignments.* (Garam, Nursing student)
>
> *I have to learn a lot [during clinical placements], prepare for the case report conference, and do my homework… While preparing for my assignments, I sometimes wonder if the clinical placement is for me to learn how to tend to patients, or for me to complete my homework... I think we need to change our curriculum so that we can gain more clinical experience during placements.* (Ari, Nursing student)

5.2.2.4. Being influenced by environmental factors (Factor 4: Environmental factors)

In the earlier description of clinical environments, the environments are dynamic due to the busy and unpredictable contexts (see *5.2. Learning during clinical placements*). In this section, nursing students and nurses demonstrate the relationship between the dynamic environments and their learning during clinical placements. Firstly, the students and nurses contend the reasons why nurses and the clinical environments look busy in their following quotations:

> *[Nurses are] busy. There are several reasons why the nurses are busy. Firstly, there are so many patients to one nurse, and there is much that needs to be done for their care. For example, the nurse needs to not only monitor the patient's V/S and overall physical condition, but also report any abnormal findings [to a doctor] to request for a doctor's prescription. After receiving the prescription, the nurse then needs to write a medical record of the patient's condition and the prescribed*

> *medication. In other words, there are so many procedures following a single patient assessment… It is not just one or two procedures, and some of these procedures need to be performed simultaneously. Moreover, if other patients or caregivers request for any help, the nurse has to respond to their requests as the nurse's role is also that of an advocate. As everyone in the hospital [where the nurse works] demands that a nurse completes all given tasks in an allotted time, nurses are therefore very busy.* (Miran, Nursing student)
>
> *I am always busy. Do you know why? We have too much work to do.* (Hansol, Nurse)
>
> *Well, I am busy doing my work.* (Sukjin, Nurse)

However, nursing students believe that the main reason for nurses' busyness is not only because of their workloads, but rather there are too many patients assigned to each nurse's care. Sori, another nursing student, further supports this view as below:

> *The number of nurses is too little in comparison to the number of patients. Therefore there is a heavy workload for each nurse to manage.* (Sori, Nursing student)

The level of busyness in clinical environments influences the amount of education provided to the nursing students.

> *I think it depends on the busyness of the wards. When I visit a busy ward, nurses educate me only while seeing patients. However, when I visit a less busy ward, the nurses educate me while seeing patients, as well as at other times.* (Hwashin, Nursing student)
>
> *When I am busy, the amount of teaching I give the students reduce. I don't have a lot of time to explain [my nursing practice].* (Nayoon, Nurse)

Hwashin asserts that she can have more opportunities of nursing education during the placements if the environments are not busy. Moreover, the level of busyness also influences the quality of nursing education. For instance, if there is a busy ward due to the greater severity of patients' conditions, it would be difficult for nurses to consistently conduct the nursing students' clinical education.

> *In a busy ward, a nurse makes some time to explain things to us, but the nurse gets called away [by patients] frequently within that short period of time, which constantly interrupts the flow of my learning. It is hard to receive proper education in one shot… [However] it could be different between wards. Although I don't want to belittle a particular department, the dependency of patients is low in the gynaecology ward and the environment is not busy. So I can receive a consistent education.* (Garam, Nursing student)

> *It would be possible to be a good teacher when I am feeling stable and relaxed. But, when I am busy, I can't actively teach and just take on the role of a bystander in clinical education. Then, the students would feel that they are being neglected. As my work is also tough on me, it is troublesome [to educate them]. At times when I am very busy, I tell them to use the EMR and learn more about the patients. As I am very busy nowadays, these situations happen frequently.* (Hansol, Nurse)

> *Honestly, we are busy because of our work duties, so we can't educate the students in detail, as nurse preceptors would, but rather, we only educate them generally.* (Sukjin, Nurse)

Thus, the busy clinical environments are related to the quantity and quality of nursing students' education during clinical placements.

Another environmental factor is the differences of nursing practice between hospitals where clinical placements take place. Students' education during clinical placements is affected by these differences, along with the lack of instructional guidelines discussed in Factor 3.

> *During the fundamental nursing practicum in my university, I learnt nursing practice, but it is too unrealistic… For example, urinary catheterization procedural rules are different between hospitals. So, I have to ask for help and learn a new method of performing the same procedure each time I go for placements.* (Dahee, Nursing student)

> *Every hospital has different guidelines for nursing practice, so when I start a new clinical placement, I don't know what to do.* (Bora, Nursing student)

As the above students believe, clinical environments and nursing practice vary between hospitals and cause them difficulties in learning as they have to adjust to both the new environments and new nursing practice guidelines for each hospital.

Furthermore, nursing students feel at risk when engaging in nursing practice in clinical environments due to concerns regarding medical service law in Korea.

> *The [medical] law restricts the extent of nursing practice we are allowed to do. When I read nursing textbooks, I can find out how nurses perform the task. However, we cannot practice it in reality [i.e., during clinical placement]. I think if we carry out nursing practice, it can cause legal concerns, so it is hard to apply our knowledge to real patients. You know, we are not real nurses. As we are students, there is limited nursing practice we can legally do.* (Dahee, Nursing student)

They also emphasise that hospitals restrict their nursing practice during clinical placements because their practice can impact on patients' safety.

> *We have to observe [nurse' practice] and practice a lot. However, when I look back on my past placements, there was not much that I could do. Especially, in the case of corporate hospitals, they put so much emphasis on patient safety that nursing students can do nothing… We are strictly not allowed to even touch patients.* (Ari, Nursing student)
>
> *We are only allowed to perform tasks such as side-shooting injection, opening medicine bottles, V/S, and so on, which have lower risk of harm to patients.* (Sua, Nursing students)
>
> *In my hospital, we don't entrust the students with much nursing care provision… I think it can't be helped, because in such clinical contexts where there's such a strong emphasis on patient safety, mistakes are simply not permitted. Moreover, from the patients' viewpoint, they also do not want to receive nursing care by lesser skilled students.* (Sunja, Nurse)
>
> *It is because of the issue of responsibility… Particularly so with medical procedures. If a medical accident was to happen while nursing students are administering medication through injection methods, the issue of who is responsible for the accident can become very serious… Patients can also be sensitive.* (Sukjin, Nurse)

5.2.2.5. Being influenced by emotional factors (Factor 5: Emotional factors)

The four contextual factors that influence nursing education in clinical contexts have

been discussed in the above four sections. When nursing students attend their placements in clinical environments, they face the above contextual factors (external factors) complexly or separately. Along with the contextual factors, emotional and physical factors, as individual factors (internal factors), influence the nursing students' learning during clinical placement. It is evident in this research that these external and internal factors are affected by each other via mutual influence. In this section, the emotional factors, which are one of the individual factors for nursing students, will be demonstrated as a connection between the contextual factors.

Yoonjin, a nursing student, expresses her depressed emotions from having to negotiate the nurses' busyness to receive clinical education, as was previously discussed in the interpersonal factors (i.e., Factor 1):

> *When I visit a ward as a student for my placements, I feel lonely. I feel like I am useless. When I sometimes receive praise from the nurses, I feel good. But… this case is rare, so I feel down emotionally… Moreover, when I want to ask the nurses a question, I have to check whether the nurses are busy or not. Thus I get stressed trying to find the chance to ask my question.* (Yoonjin, Nursing student)

Yoonjin continues to describe her emotions regarding the interpersonal relationship between herself and the patients. She expresses feeling a sense of shame within the relationship because she is unable to provide care to patients when they need it. She believes that this is due to the restrictions nursing students are under with regards to engaging in nursing practice.

> *As students, we cannot do anything within the relationship between the patients and ourselves. If the patients have any requests, we just play the role of a messenger [by delivering the request to nurses]. In this atmosphere, I feel there is nothing I can do and I feel a sense of shame. Although this feeling is not reflected in all cases, I feel like that in most of them.* (Yoonjin, Nursing student)

On the other hand, the students do not express any emotional burdens within the relationship between university lecturers and themselves. It can be interpreted that they have already built a stable rapport with the lecturers and this rapport does not give them any emotional burdens.

Nursing students also get stressed emotionally due to their low social position during clinical placements in the socio-cultural aspect.

> *In the clinical contexts, I am 'eul' [position] anyway. This is because all others around me are 'gab'. I feel really stressed with this positon, both emotionally and physically.* (Hyemin, Nursing student)

Furthermore, in Korea, where the culture of collectivism is conventionally dominant, nursing students are more worried about whether they have a negative impact on others (especially nurses) during clinical placements, rather than their own learning. It means that even in pursuit of personal goals and desires, they tend to first consider the standpoints of others, and alter their behaviour accordingly so as to maintain social harmony and not inconvenience those around them. This is particularly true in cases where one regards the relationship with another as important; in this case, the students do not wish to inconvenience the nurses, who they regard as their main educators during clinical placements.

> *I worry about whether I am performing my role well while trying to bring less harm and trouble [to the people in clinical environments].* (Sarang, Nursing student)
>
> *Although I have a question, I can't simply ask [nurses] for the answer. This is because nurses will spend time to answer my question, which stops them from performing their tasks. So, even though I would like to, I try to reduce asking my questions, or not ask at all.* (Ari, Nursing student)
>
> *One day I was joking with my friends that, "Our existence itself would cause damage"... I don't like to cause any damage to others... [I feel that] I may give*

nurses a hard time. (Sua, Nursing student)

Nursing students' emotional responses towards nurses are clearly ascertained in their interviews as a complex factor between interpersonal and socio-cultural factors. In this research, nursing students are scared of nurses.

> *I fear the nurses… It is also because it is a human relationship within the clinical environments… It is very stressful when I worry about being scolded by nurses. In other words, it is the most stressful when I have to study nunchi*.* (Yoonjin, Nursing student)
>
> *If possible, I don't ask questions, because I may be scolded [by nurses]. I can't determine whether my questions are the ones that I can ask the nurses or not. If I ask a question, I am afraid that the nurses would say, "Why didn't you study before coming here?" Although not all nurses are like that, if I meet a scary nurse, the atmosphere will not be good and I will want to go home… I get so nervous, uncomfortable and feel nurses' nunchi*…* (Bora, Nursing student)
>
> *It is hard to ask a question, because I am afraid the nurse would scold me for not knowing the answer myself… And I am scared, because I saw an incoming nurse being scolded [by a senior nurse]. So, I fear and get stressed that I would be scolded like that.* (Wanki, Nursing student)
>
> *Nunchi will be discussed later in this chapter as the nursing students' key response to these six factors (see *5.2.3.2. Using nunchi mechanism*).

In the aspect of instructional factors, nursing students get emotionally stressed due to their unclear role and heavy workload as discussed earlier.

> *I get more stressed because I have to do assignments, such as case reports.* (Sori, Nursing student)
>
> *I feel like [I would bother nurses] as I stand around and do nothing. When I observe nurses writing up the charts or interacting with patients, I feel like I don't know anything and there's a limit to the knowledge I gain. When I go for placements I just seem to stand there, feeling like a burden. I know I should do something although I don't know what, and because I can't, I feel guilty.* (Sua, Nursing student)

In addition, the dynamic clinical environments also give nursing students emotional burdens.

Clinical environments are stress in itself. (Yoonjin, Nursing student)

I get stressed when I go to clinical environments, as I need to carry out my nursing duties according to the busy schedule there. (Wanki, Nursing student)

It is obvious that patients' lives are dealt with in those environments. Sometimes, there are cases of cardiac arrest or death, so I feel like I am becoming more hard-hearted. (Garam, Nursing student)

5.2.2.6. Being influenced by physical factors (Factor 6: Physical factors)

Following the emotional factors, nursing students assert that they are affected by the physical factors during learning in clinical environments.

As a nurse's off duty consists of three shifts, nursing students have to adjust to the shift work and change their lifestyle patterns during clinical placements. However, this changed pattern gives the students a physical burden.

I have get up early in the morning and stand all day long. The resulting tiredness affects the rest of the day… I have to stand all day, without having anything to eat beforehand. Moreover, I never finish work [on time] at 3pm and by the time I leave at 5pm, I feel the exhaustion of the past 12 hours rush up on me. The remaining time till I go to bed is my free time but I can't spend it the way I want [due to the fatigue], which I hate even more. (Miran, Nursing student)

Because I have to go to the hospital early and I finish late. It is physically very hard. (Bora, Nursing student)

In addition, nursing students believe that they have physical burdens because of the different environment of hospitals from classrooms in their university, and the differences of their roles in the environment. Nursing students point out that they have to stand up during clinical placements and it is identified that there is no space to take a rest for them.

> *As I stand up continuously, it is physically challenging, whereas it is better in my school because I can sit down.* (Dahee, Nursing student)
>
> *There isn't any place where I can sit and rest… I just stand all day, minding the nurses' gaze upon me. Nurses can sit in a chair while writing medical records, while, honestly, there is no place for us to take a rest [in clinical environments]. Moreover, when the nurses have their tea break, we have to leave them alone for a while.* (Yoonjin, Nursing students)

Along with the physical burdens from the environmental and interpersonal factors, nursing students are also affected by the emotional factors, which increases the physical burdens.

> *When I follow nurses who are not very friendly, my body is affected by my emotions, for example I have a headache and stomach pain… I haven't much of an appetite and my facial expressions are different [from usual].* (Miran, Nursing student)

Nursing students indicate that the physical burdens from the environmental, interpersonal and emotional factors all influence their study during clinical placements as individual factors.

> *Because I don't have enough stamina, I feel like my time has been wasted and I am unable to study, which upsets me.* (Sarang, Nursing student)
>
> *Yes, it builds up. For example, today was the last day of clinical placements in an operating theatre. The charge nurses gathered us and asked how our placements were, and if we had any questions for her. However, all the students dozed off. The fatigue built up over the course of our placements and furthermore, we didn't sleep much last night preparing for the conference. The nurses intended to teach today, but we all dozed off, retaining nothing that was taught.* (Yoonjin, Nursing student)

Nevertheless, nursing students emphasise that their study during clinical placements is affected more by the emotional factors than the physical one, amongst the individual factors.

> *I think the emotional stress has a longer-lasting effect on me.* (Ari, Nursing student)

I think the emotional burdens [during clinical placements] are much harder than the physical ones. In the beginning, I felt that standing all the time was hard and my legs hurt but I got used to it [and it became less painful]. On the other end, the emotional stress has stayed the same. (Hyemin, Nursing student)

5.2.3. Nursing students' response of the six influential factors

5.2.3.1. Conforming the condition in clinical environment

Undergraduate nursing students attend clinical placements to build proper nursing knowledge and to reduce the gap between nursing theory and clinical practice. From an educational point of view, the clinical contexts include many negative components regarding their nursing education. Six factors have been identified to be involved in their education during clinical placements and many of the nursing students believe these factors negatively influence their learning (see Table 16).

Table 16. Nursing students' negative responses towards clinical placements

Factors	Students	Quotations
Interpersonal Factors	Kuntaek	*I think it is completely wrong that nurses think we should learn and figure out everything by ourselves in clinical contexts*
Socio-cultural Factors	Sua	*I cannot say anything when the nurse practices differently to what I have been taught [at school], so I simply observe*
Instructional Factors	Eunju	*We can only observe [nurses' practice], so we don't have enough opportunities to learn anything practically*
Environmental Factors	Hyemin	*In these clinical environments you can't learn nursing practice properly and be fully exposed to learning atmospheres. So, we learn very little*
Emotional Factors	Yoonjin	*Nurses are scary, so I feel burdened to ask my questions*
Physical Factors	Sarang	*My learning is affected by the physical burdens from clinical placements. Therefore, I cannot study well*

However, they attempt to orientate themselves to the contexts and understand the educational conditions within clinical environments due to inevitable circumstances.

> *There are very few things we can do as students during clinical placements. I find this frustrating. However, I understand I can't amend this situation as a student.* (Dahee, Nursing student)
>
> *We are only allowed to do the observation and the measurement of V/S. It is not different from what I expected [about clinical placements].* (Sarang, Nursing student)

Moreover, they also understand the situation whereby nurses cannot afford to engage in and focus on their education, although the nurses are the most influential people for their education in clinical environments.

> *I have no choice but to understand the nurses' stance because they are so busy.* (Hyemin, Nursing student)
>
> *I know that even if the nurses focus only on their duties, they will still end up working overtime. To further explain things to us and educate us, they would end work even later. Also, for the tasks they can complete in one minute, I would require five. If you look at it that way, our clinical placements cause inconveniences to the nurses, with no reward. So, nurses would probably dislike having students around.* (Miran, Nursing student)
>
> *I understand that nurses have to complete their duties in time so that they don't do overtime. For example, however, it would be simple for nurses to administer medication to patients without explaining what kind of medication it is to us, but their tasks would be delayed if they do.* (Yoonjin, Nursing student)
>
> *I try to not give nursing students any nursing tasks. Because I have to observe students while they are completing the task, it takes longer. So I don't like it. If I do the work myself, I can finish it faster than the students.* (Hansol, Nurse)

Although nursing students are struggling to learn in clinical environments due to the six influential factors, they conform to the educational conditions as above, and they are aware of the importance of clinical placements, which enable them to experience real clinical environments.

I might not know what the nursing processes are, how to make nursing diagnoses, and so on, if I only learn theory without the clinical placements. Now, I know these because I have gained experience through the placements. (Hyemin, Nursing student)

All my seniors have told me that we should learn in the clinical environments so that we can work in the same environments later. I strongly agree with them. (Wanki, Nursing student)

I learn skills that we really practice in real contexts [after becoming a nurse]. Therefore, clinical placements are realistically more helpful [than theoretical knowledge]. (Sori, Nursing student)

As they are aware of the importance of clinical placements, the students accordingly desire to build on their nursing knowledge and increase their nursing practice in the clinical environments by nurses.

I can remember my experiences during clinical placements longer than the education received in the classroom… It is a shame that I really want to learn more in the clinical environments, but I can't. (Dahee, Nursing student)

I hope nurses think we are nursing staff and educate us like the new nurses. I think we need that environment to receive effective nursing education. The nurses educate the new nurses a lot but they don't educate us like that even though we need it. (Bora, Nursing student)

I think the clinical environments are ideal [for learning nursing practice]. But, [nurses] don't pay us enough attention. They don't care about us. Although it is only my own opinion, I really hope there can be the notion of a nursing preceptor for us students [for our clinical education]. (Kuntaek, Nursing student)

5.2.3.2. Using nunchi mechanism

The student nurses in this study identified features of the clinical contexts that were not beneficial to their education, however they attempted to embrace and maintain their education in these clinical contexts. Amidst these clinical educational circumstances, this research discovered that nursing students in Korea use a key social mechanism in the interpersonal relationship to analyse the contexts and then decide on

the behaviour they need to adopt to complete their placements. This mechanism is 'nunchi'.

> *When I need to explain about the clinical placements, I can't do it without the use of a word, nunchi.* (Yoonjin, Nursing student)
>
> *Nursing students should see nunchi [in clinical environments] of course.* (Sunja, Nurse)

All nursing student participants in this research use the word 'nunchi' in order to explain their responses and decisions regarding their education in the environments. Nunchi is a Korean word and it literally means 'eye sense' (Yi & Jezewski, 2000; Kim, 2003), or 'eye measurement' (Lee, 2012) in English. The meaning of nunchi, a noun, can change according to the combination with and use of verbs. The meaning of nunchi can be explained in two aspects with two types of verbs. The first type is to 'study nunchi', **눈치 살피다** /nunchi salpida/ in Korean.

* Similar expression: See nunchi: **눈치 보다** /nunchi boda/

> *I think nunchi is to study the atmosphere. For example, I study [clinical atmosphere] with these questions, 'Will I get scolded if I do this?', 'Should I follow the nurses?' and so on… We try to think of a way so that we will not get scolded [by nurses, by studying nunchi].* (Dahee, Nursing student)
>
> *I think the definition of nunchi is not to act only according to my views, but to be constantly conscious about others' tacit or obvious [behaviours]. To be conscious of and act accordingly to feedback, or direct and indirect stimulation received from others.* (Hyemin, Nursing student)
>
> *Nunchi is to be able to stand in other people's shoes and consider their thoughts [and feelings], and to not simply do things my way.* (Sarang, Nursing student)
>
> *Nunchi, while based on social courtesy, is the process of finding opportunities… It is about being considerate and catching the right timing so as to not become a hindrance to others. Whether other's needs come before my own… Nunchi is about having the sense [for such situations], particularly having the ability to read a certain situation. I think that is why it is called 'eye measurement'.* (Nayoon, Nurse)

The meaning of ‘to study nunchi’ is an effort to understand others in a certain environment by studying the atmosphere and discovering the embedded intention of others’ behaviour. This is an individual’s social interpretive process of others from a first-person perspective and a subjective communication method.

Grounded in this definition, when nursing students enter clinical environments, they study the nurses’ nunchi to analyse the atmosphere fostered by nurses, and attempt to find the hidden meaning behind the atmosphere fostered. Following this, nursing students prepare for how they should behave in those environments for their placements, based on the revealed meaning through their interpretation. This process does not contain either positive or negative nuances, but rather, the individual’s active volition to understand the atmosphere.

The second combination between nunchi and its verb is to ‘feel nunchi (from other)’ or to ‘give nunchi (to me)’, **눈치 보인다** /nunchi boinda/ or **눈치 주다** /nunchi juda/ in Korean respectively. ‘To study nunchi’, as mentioned above, is neutral in meaning, whereas ‘to feel nunchi’ and ‘to give nunchi’ mostly connote negative meanings. As these two negative phrases present, there is a giver and a taker of nunchi within a context. During nursing students’ clinical placements, the giver of nunchi is the nurse, who is the most influential in the students’ nursing education, while the taker is the student. Nursing students 1) feel nunchi when they believe that nurses allude to their demands or their discontent with the students via indirect messages, such as the nurses’ language or behaviour, or 2) are worried in advance on whether their behaviour incommodes the nurses. Thus, they tend to be more discreet in their behaviour and that causes them to negatively study nurses’ nunchi. As a result, they believe the nurses

actually give them nunchi as the following quotes illustrate:

1) Nursing students' quotations of the former case:

> *While in the hospital, I have to study the nurses' nunchi. I have to keep following the nurses. I feel so awkward and I can feel [nurses'] nunchi. The nurses hope that I would find something to do on my own, but there is nothing I can do and just standing there, I can feel the nurses' nunchi. I should do something but there is nothing I can do, so it is really hard and I feel bad.* (Bora, Nursing student)
>
> *I study nunchi [in hospital]. I don't know if the nurses truly think that way or are simply not friendly with us, but when I used a computer to read a patient's information, a nurse told me, "Shouldn't you go and ask the patient directly?" In this way, they give me nunchi with regards to using the computers [that they wish to use]*. (Hwashin, Nursing student) (i.e., the nurse wanted to use the computer that Hwashin was using, but the nurse expressed her want indirectly.)

2) Nursing students' quotations of the latter case:

> *I constantly worry if I will be a hindrance to the nurses on the ward. So I feel nurses' nunchi. I also worry about how others will appraise me… Even though nobody really says anything to me, but I feel this way.* (Sua, Nursing student)
>
> *When I start clinical placements, I study the atmosphere of the ward and then when I see the nurses in the station, [the atmosphere] looks very uncomfortable. So as a student, I feel strong nunchi.* (Bora, Nursing student)
>
> *The clinical environments inhibit me from learning freely. If it were up to me, I would not just follow the nurses around, but also learn nursing skills on my own in the ward. But I can't do this because I feel nurses' nunchi. Moreover, when I have a question, I can't ask the nurses my question as I wish, because I feel nunchi.* (Sori, Nursing student)

Meanwhile, when the students say 'feel', the students do not exactly know whether the nurses really want to change their behaviours or not, and whether the nurses really feel as uncomfortable as the students' think. In other words, nunchi is only the individual student's subjective interpretation of the contexts and it is unclear whether the interpretation is correct (perceiving correctly) or wrong (misinterpretation).

The reason why the nursing students use the nunchi mechanism during their clinical

placements is complexly affected by the six influential factors. Among these six factors, the nunchi mechanism is deeply relevant to the interpersonal and socio-cultural factors. Nursing students assert that the nunchi mechanism is mostly invoked by the hierarchical relationship between the nurses and themselves.

> *I think [nunchi is caused by] the relationship of gab and eul… It depends on how I personally perceive my social position? I can be the 'gab' when I compare myself with the junior students in my school. I don't study their nunchi… But, if I am the 'eul' to someone, I should do as they wish.* (Hyemin, Nursing student)

> *We should initiate and approach the nurses to request for teaching [during clinical placements], but we have to study each nurse's nunchi first. We can learn something when we study the nurses' nunchi and then ask something. We cannot learn in our own way due to our lower position [in clinical placement], although we really want to learn. Moreover, if nurses teach me incorrect nursing knowledge, we have to say "yes" and just accept the knowledge.* (Dahee, Nursing student)

> *A bad experience... it can't be helped as nursing students are in the lower 'eul' position, so we have to study the doctors' nunchi, nurses' nunchi, patients' nunchi, caregivers' nunchi, and so on. It is so stressful.* (Yoonjin, Nursing student)

Nurses and university lecturers also acknowledge that the nunchi mechanism is caused by the presence of social hierarchy in clinical environments.

> *Yes, I do think the students feel nunchi. I think any Korean, when he or she goes to someplace new, or meet new people, [they would study nunchi]. Moreover, we may not be their bosses but we are their elders. So, it is right they should study nunchi. When I was a nursing student, I also studied the nurses' nunchi.* (Sukjin, Nurse)

> *The reason why students feel nunchi is because they would believe that the nurses' social position is hierarchically higher than their own position, so they would find it difficult to ask their superiors [their questions]. It is the universal human relations in Korea… It would be easier if the students could ask [the nurses their questions] with the mentality of "As a student, I will learn whatever there is to learn!" But, it is actually really difficult [for them to do so]… I think it would be nice for students if we could change this Korean culture bit by bit.* (Jongwon, University lecturer)

As the nursing students quote, it is identified that social position is a strong indicator of the nunchi felt, and the person in a lower position would have to unilaterally study

the nunchi of the person who is in the higher position of the social relationship. Hence, the nursing students who are in the lowest social position in clinical environments have to watch nurses' nunchi. As the characteristics of nunchi have been explored, nunchi is a mechanism that can be connected to the characteristics of collectivism, as one considers his/her own position and attempts to maintain harmony and not inconvenience others in higher position.

Meanwhile, nunchi is a unique socio-cultural mechanism based on collectivism in Korea, compared to other Western countries as Sunja, a nurse, argues below:

> *Nunchi can't be built in a day. I think it is embedded in our culture. Once, a student from the UK came this ward for her international placements. I felt she was too bold and was very criticising. I was very surprised… I just think of it as cultural differences. She didn't study nunchi.* (Sunja, Nurse)

Nursing students show their willingness to build an amicable relationship with nurses and successfully foster their education via the nunchi mechanism. However, the nunchi caused by the social hierarchy has brought substantial emotional burdens to the students.

> *There are many situations in which I have to study nunchi [during clinical placement]. The clinical environment is still an uncomfortable place for me. I get stressed [in the environments] a lot, because I have to study [the nurses'] nunchi. The atmosphere of clinical placements is not comfortable and enjoyable at all. So, I feel like I don't learn as much as I think I can.* (Eunju, Nursing student)
>
> *I think nunchi has a great psychological influence on me. It makes me a little nervous, and if this feeling gets too much, I feel intimidated and so on.* (Hyemin, Nursing student)
>
> *My biggest reason for getting emotionally stressed in clinical environments is nunchi. It is much too arduous for me*. (Yoonjin, Nursing student)

Nursing students in clinical environments study nurses' nunchi in order to facilitate

their nursing education. Although the emotional factors were discussed in the section of influential factors on clinical placements before, nunchi can be regarded as a major source of emotional burden on nursing students. This is because the nunchi mechanism is mainly activated in the presence of hierarchical relationships, a source of emotional burden on the nursing students. Making the effort to study the nurses' nunchi, worrying about being appraised, and then suppressing their true feelings so as to present themselves in a way that is satisfactory to the nurses takes a great emotional toll on the students.

Rapport was previously discussed as playing a positive role in nursing students' education during clinical placements. Nunchi has been verified to influence the rapport between nurses and nursing students, and the rapport also has an effect on nunchi in turn. This relationship between nunchi and rapport consequentially influences the students' learning in clinical environments. As nunchi contains the students' desire to build a positive interpersonal relationship, nursing students are required to study nurses' nunchi and to successfully deduce the nurses' demands of them in the socio-cultural contexts, so that they can increase the rapport with nurses and then construct positive relationships.

> *Nunchi is important to build good rapport… When I go [to a clinical ward] on the first day, I bow to the nurses politely and enthusiastically follow the nurses. From then, the nurses open up to me, although they used to not really talk to me. When I show my enthusiasm by actively following the nurses, they give me many opportunities to do nursing practice. After I respond to the nurses' demands well and help them a lot, they begin to educate me really well… As a student, I should ingratiate myself with the nurses by studying their nunchi. Then I can gain favour with them. There is a cycle that if I behave in a pleasant manner towards the nurses [by studying nunchi], they will be positive in their attitude to me so I can build a good relationship with them, and then I can comfortably complete my clinical placements.* (Garam, Nursing student)

As Garam emphasises in the last sentence, it can be inferred that the positive relationship (i.e., higher level of rapport) with nurses reduces the negative aspect of nunchi from the nurses and consequently, the students can learn in a better clinical atmosphere. In other words, the high level of rapport brings about positive effects on the students' learning by reducing the negative influences of nunchi. Yoonjin, a nursing student, more clearly evidences this:

> *During my clinical placement, I followed and aided nurses by studying the nurses' nunchi well. As a result, I became closer to the nurses. After becoming closer to the nurses, the wall between the nurses and myself was broken down little by little. So, I didn't need to study the nurses' nunchi as much, I could make small jokes with them, and I could comfortably do and enjoy my placement. The nurses also taught us a lot. So, it was of much benefit to me.* (Yoonjin, Nursing Student)

Along with this level of rapport, nursing students' attitudes towards clinical placements are also closely related to the nunchi mechanism. When the students enter the clinical environments, they use the nunchi mechanism and start to study nunchi. After studying nunchi, the nunchi either positively or negatively influences their education, based on their attitudes. As confirmed above with Garam and Yoonjin's quotations, when they behave actively after studying nunchi, they could obtain positive results such as reducing nunchi, reducing its associated emotional burdens, and enhancing the educational efficiency of the environment during their clinical placements. Hwashin and Sua, nursing students, also assert this point:

> *I had an opportunity to talk to a charge nurse during my clinical placement for nursing management. She told me "I feel good because you respond well when I teach you something, so I will teach you more." When I go to clinical environments, I try hard to learn, even if I don't have any interest [in that area]. Moreover, when I would request to do nursing practice, the nurse would ask me, "Have you ever done this before?" Of course, there are so many things that I'd be doing for the first time… So, I would reply, "No, but I really want to try this practice. If you would teach me, I would like to try doing it." Then the nurse would say, "Okay,*

try it," with a smile. However, my friends would just reply, "No", or "Of course not". So, of course, the nurse wouldn't give them the opportunities to practice… I think it is not what I say but how I say it… My friends also complained that [clinical placements] are very tough for them as they have nothing to do but study nunchi. This was not so in my case. Even when I don't have anything to do, I actively studied nunchi to gain opportunities to try many things. If you go through your clinical placements without doing anything, eight hours [each day on placement] will feel like a punishment. If that feeling causes one stress, then in that same situation, studying nunchi to do more might actually reduce one's stress instead. (Hwashin, Nursing student)

I didn't know much at the beginning of my clinical placements. However, I felt less nunchi because I tried to be active. For example, a patient had high fever, so I actively checked the patient's temperature and notified a nurse. After that, I asked, "This is the patient's temperature, shall I administer an ice bag to the patient?" So, the nurse liked it. [So I could feel less of the nurse's nunchi]. (Sua, Nursing student)

As the nursing students indicate, the active and positive attitudes increase the educational efficiency, whereas nursing students' passive and negative attitudes cause the restriction of their learning in clinical environments themselves.

Many of my friends don't want to receive negative feedback and be scolded by nurses. So they end up not saying anything, and become passive while studying nunchi. (Miran, Nursing student)

During my clinical placements, although I want to ask something, I don't ask because I feel nunchi. If it [continues] like this, I will lose interest in nursing studies totally. (Dahee, Nursing student)

If I study nunchi too much, I feel I become very passive. When I continuously study nunchi like that, I wonder whether I can ask [nurses] a question or not. In many cases, after much consideration, I end up not asking my question. (Yoonjin, Nursing student)

Interestingly, Hwashin and Sua who have talked about the positive aspects of nunchi also report the cases of negative nunchi as above. This is because unpredictable clinical environments and inconsistent nurses' attitudes towards the students could cause this circumstance. It means that the nursing students' attitudes towards nunchi is affected by the clinical contexts and their responses to nunchi can be different according to the

circumstances. However, it has been clearly seen that the students have more chances to be educated when the students have active and positive attitudes, rather than being passive and negative.

These nursing students' attitudes towards clinical placements are necessarily related to their confidence. The students' active attitudes and successful experience of studying nurses' nunchi enhance their confidence of their performance and this enhanced confidence benefits their learning in clinical environments. However, the students who had to study nurses' nunchi in unpredictable clinical environments have difficulty in successfully interpreting nurses' intentions by studying nunchi. This context causes a reduction in their confidence, reinforces their passive attitudes, and results in negative study of nurses' nunchi.

> *I think nunchi greatly influences my confidence. When I actively study nurses' nunchi, I know what I should do. So, I perform confidently. Moreover, when I am confident, it helps in my education and I can take control of my learning. If I passively study nurses' nunchi, I worry about whether I should do the task or not, which reduces my confidence.* (Yoonjin, Nursing student)

> *As nurses think they are busy, they want us to study their nunchi properly in clinical environments and figure out by ourselves what clinical practice we want to learn. You know, to study someone's nunchi is really difficult. As we are exposed to this context for a long time, we become more passive and intimidated. I think we will experience a huge gap between the clinical environments that we are currently experiencing as students and the clinical environments that we will experience after becoming a nurse.* (Hyemin, Nursing student)

> *When I face unpredictable moments, I become passive. For example, a nurse suddenly comes up to you and asks you, "What are you doing?" Then, I study nunchi and without knowing it myself, I would stop what I was doing completely. Although I didn't do anything wrong, I would start to think about what I have done wrong. So when I can't resume what I was doing, I start to become passive and lose confidence from then on. That would cause me to continue studying nurses' nunchi negatively.* (Miran, Nursing student)

Meanwhile, their negative study of nunchi is related to their difficulty adjusting to a

real social world in clinical placements. The clinical placements would be the first experience for nursing students to be engaged in the real social world in their profession area. Their social activities have taken place mainly within the university boundaries with peers, but the clinical placements allow them to take their first step into the real world of being a nurse.

> *I think the students would be able to learn how to engage socially [during clinical placements].* (Sunja, Nurse)

Thus, they would not feel familiar in the clinical environments, compared to the classroom environments where they used to study. Their social skills, as required in the clinical environments, would be immature, although there would be differences among individuals.

> *Students, however, are not familiar with the real world, and are just thrown into it. Actually, social relationships in clinical environments are beyond the students' ability to manage. So, it causes big burdens [to students].* (Miran, Nursing student)

> *It is not something I had learnt about, [so] I didn't really know that I should study nunchi [during clinical placements], but I realised that I need to study nunchi after experiencing the clinical environments.* (Ari, Nursing student)

In particular, their immature social skills in clinical environments, where there is a strong social hierarchy, would reinforce the negative nunchi mechanism and decrease their confidence during their placements. These immature social skills could cause difficulty in enhancing the rapport with nurses, and the students are restricted to develop the social skills within the short period of clinical placements.

> *I think it is much harder to build rapport [with nurses] in clinical environments, as compared to other environments.* (Garam, Nursing student)

However, it has also been identified that the students have adjusted themselves to the

social environment within the clinical context during placements over the course of time by developing their nunchi mechanism.

> *I have developed some nunchi, so I now know whether I can sit down, touch this, say this, and so on. Because of that, it is less tiring than before. In the past, it was a lot harder on me emotionally than physically. If the nurse scolds me just once, I would be distressed all day long. But now it is not like that, because I got used to the clinical environments and thus could enhance my nunchi skill.* (Dahee, Nursing student)
>
> *As days went by, I learnt how to communicate [with nurses]*. (Eunju, Nursing student)
>
> *When I recall the old days, [the clinical environments] seemed overwhelming, very confusing and scary. As though there's always a wall to overcome, because I don't know what is going on. However, I now know what is happening in the environments, so it is slightly different now. I have personally become confident [within the clinical environment] and feel more familiar with the environments.* (Kuntaek, Nursing student)

That is to say, nursing students learn nursing knowledge as well as the process of socialisation to adjust to the clinical environments. This accords with the purpose of clinical placements (i.e., adjustment to clinical environments) of which the students believe. However, this process of both socialisation and education in clinical environments would not be efficient, as many negative aspects towards nursing students in the environments have been revealed in this research already.

5.2.3.3. Undertaking self-directed learning

From the nursing students' point of view, they should be properly educated in clinical environments. However, there are many components negatively influencing their learning in those environments. Although the students are not completely supported in clinical environments for their study, they still wish to receive teaching and would

watch for opportunities to be educated by the nurses using the nunchi mechanism. During this process, it has also been identified that nursing students assert that self-directed learning in the environments is crucial for their learning.

> *Self-directed learning is the most important [during clinical placements]. The starting point for my learning is my will to learn.* (Hwashin, Nursing student)

In the unsupportive clinical environments, the students believe that for the sake of their learning, they are required to design their own learning plan and then apply it to real clinical contexts during placements.

> *My university lecturers advised us that although we are not given many chances to do nursing practice, we should actively find other things that we can do such as talking to patients more and changing patients' positions. Although it might not be enough experience [as we wish], you can still do some things. It depends on individual abilities.* (Garam, Nursing student)

> *Because the nurses don't teach us [enough] I have to actively seek opportunities to learn by myself. A charge nurse in a hospital told me, "The nurses are busy, so you should observe and learn by yourself"… I am scared of the nurses and of asking questions in the ward, so I realised I have no choice but to self-study, which makes my confidence drop.* (Yoonjin, Nursing student)

> *[During clinical placements,] we can come across medical devices I have never seen before. When I ask nurses what it is and how to use it, most of the time, they try to answer my questions. If I truly wish to learn properly, I have to actively pursue it and ask first.* (Sori, Nursing student)

As indicated above, it is identified that the students are required to have pro-active attitudes towards their learning in clinical environments. For example, they need to find things that are helpful for their study by themselves, and they need to ask the nurses their questions first rather than wait to be taught. This finding can be connected to the aforementioned nursing students' active and positive attitudes being beneficial to their learning using the nunchi mechanism.

Although nursing students' active attitudes towards learning are required in clinical environments, there is a limitation to studying alone and they still need education from the nurses.

> *While studying on my own, I found that a patient was X-rayed. I was curious as to why the patient was x-rayed [but I couldn't find out why]. Just based on that information, I don't know why this patient had an X-ray taken, and what the results indicate [with only my own knowledge]*. (Sarang, Nursing student)

Moreover, as it has been put forth many times, the clinical environments do not offer the contexts in which nursing students can actively and fully focus on their studies as they feel the need to negotiate the social hierarchy (i.e., socio-cultural factors) and existing environmental factors that influence their clinical placement learning.

> *Nobody has been appointed to guide me in clinical environments, so I have to learn of my own accord. But in doing so, it is not very focused learning…* (Hyemin, Nursing student)
>
> *When I go to clinical environments, I should actively find things that I can learn by myself. But I think the current clinical environments are not conducive for educating nursing students.* (Eunju, Nursing student)

Thus, nursing students are required to develop their ability in dealing with the above concerns by using the positive nunchi mechanism to create more opportunities to autonomously and actively learn in clinical environments.

5.2.4. Nursing students as emotional labourers during clinical placements

As previously discussed, nursing students believe that the emotional factors are one of the most influential factors out of the six, with the nunchi mechanism causing

additional emotional burdens to the students.

> *I think the greatest influence on our education is due to the lower social status of being a student. If we were given a little more regard, I believe the atmosphere for our learning would be better [in clinical environments]… The psychological aspects greatly influence our education as well. Clinical placements are a series of [emotional] stress. I can't concentrate my learning.* (Yoonjin, Nursing student)

> *I am sure that nursing students get emotionally exhausted. Everything in clinical environments is surrounded by human relationships, such as those with nurses and patients. As we need to manage these human relationships, we can get emotionally exhausted quite often.* (Eunju, Nursing student)

Nursing students believe that nurses are emotional labourers and they too, are emotional labourers as they share the same environments with the nurses, and will soon take on the same roles as the nurses.

> *[Nursing students are] part of the nursing community and we will become nurses soon. Patients also look upon us as nurses. So, just like the nurses, I think we can also be called emotional labourers.* (Miran, Nursing student)

However, nurses mostly experience the emotional labour within their relationship with patients, whereas the nursing students experience the emotional labour within the relationship with nurses rather than with patients during clinical placements.

> *Nursing students have less contact with patients than nurses, so they experience lesser [emotional] burdens in the relationship with patients [compared to nurses]. However, in place of that, students experience greater emotional burdens in their relationship with nurses.* (Miran, Nursing student)

> *I think both nurses and nursing students do emotional labour, but there is a small difference between them. The students try to be helpful to the patients during clinical placements but because they can't do so, that causes emotional labour for the students. However, it is clear that patients are not the main objects of emotional labour to the student, but rather the nurses.* (Yoonjin, Nursing student)

The nursing students believe that they can learn better if they can reduce the expenditure of emotion.

> *I believe I can do active and self-directed learning when I am in a situation without the emotional stress… I wonder if that stress has a detrimental effect on my education.* (Hyemin, Nursing student)

The nursing students' negative emotions, however, do not indicate that they want to reject the clinical placements, but rather, express the emotional hardships they go through during the placements.

5.2.5. Conclusion of the learning during clinical placements

In the sections of 5.2, nursing students' education in clinical environments has been explored.

Firstly, a learning process of four stages during clinical placements was identified (i.e., entering clinical environments, observing nursing practice, investigating nursing information and undertaking nursing practice). Following this process, the six factors (i.e., interpersonal, socio-cultural, instructional, environmental, emotional and physical factors) that influence the students' learning in clinical environments were discovered and explored. In the clinical environments with the six factors, nursing students' responses to the environments (i.e., conforming to the condition in clinical environment, using nunchi mechanism and undertaking self-directed learning) were explored.

Within these clinical contexts, nursing students are experiencing difficulties when it comes to devote themselves to in-depth learning in the environments. They watch for opportunities to be educated during their clinical placements using the nunchi mechanism, and learn how to adjust to the environments and how to socialise within

clinical contexts. Moreover, they can also be called emotional labourers along with nurses due to their emotional burdens during placements, but the object of their emotional labour is largely different from nurses.

5.3. Simulation-based learning in nursing education

Simulation-based learning is one of the important components of the nursing education curriculum. In contrast to clinical placements, this learning is for training nursing practice and is conducted in simulation laboratories in universities. Nursing students believe that the main purpose of the SBL is to have opportunities to conduct nursing practice and utilise their nursing knowledge in an environment that has been set up to be similar to the clinical environments. This learning is essential, because the students are not able to undertake enough nursing practice for their training during clinical placements. In turn, nursing students are given chances to design the nursing plan and to perform nursing practice themselves in the universities' simulation laboratories.

> *You know, we can't apply nursing practice to real patients [during clinical placements], because we are not real nurses and there are legal restrictions. However, we can do nursing practice under the premise of being a nurse during simulation as a manikin replaces the patients. When I go for my clinical placements, I will be able to recall my simulation experiences and know what should be done in certain situations. It is my direct experience with nursing practice in a certain situation and I can reflect on this experience during my clinical placements… Again, as we can't apply nursing practice to real patients in real clinical environments, technology is used for our training.* (Dahee, Nursing student)

> *I think there are many restrictions to the nursing practice we can do in hospitals. We are not nurses yet, so there is a limit to what we can do, especially performing invasive nursing procedures. However, we are given chances to practice what we have learnt through simulation. In the hospitals, we can't actively design the nursing plan but we [passively] accept the plan the nurses designed. You know we have to stand back. But, we can design the procedural plan and practice the*

nursing procedures through simulation. (Eunju, Nursing student)

The hospital clinical placement is originally the most important [component of the nursing course]. However, the students are unable to do much in hospitals. Therefore, at present, it is inevitable that many universities teach using simulation-based scenarios. (Hyori, University lecturer)

The SBL has become a trend in the field of nursing education over the past 2~3 years. Nursing schools located all over the country have joined in on this trend and installed facilities for simulation training. Considering patient's rights, it is to prevent patients from feeling like they are martyrs [for the students' education]. Patients are very reluctant to become the object of the students' clinical education during placements, like materials for experiments. Therefore, the quality of the placements drops… So, all [nursing practice] that cannot be done with real patients is fulfilled through the use of cutting-edge tools for SBL. We think this is a good method of learning that will enhance the students' competency in nursing practice. (Jongwon, University lecturer)

Many nursing schools in Korea have increasingly instituted SBL using high-fidelity interactive manikins (i.e., SimMan®[1]) based on ICT, as Jongwon reported above, and all nursing student participants in this research have also been educated through SBL using the SimMan®. These simulation environments in universities are distinguished from the traditional environments of university classrooms and benefit from the development of educational technology. These educational environments for simulation consist of three different rooms (i.e., simulation, control, and debriefing rooms).

- Simulation Room,

As is shown in Picture 1, the simulation room has been designed to be similar to the

[1] SimMan® is a high-fidelity patient simulator (i.e., manikin) and made by Laerdal, a manufacturer of simulators in Norway. The SimMan® enables recreation of realistic clinical situations through the mock patient. Learners are encouraged to critically understand problems which are caused for the SimMan® and solve the problems themselves. Through this process, the learners are able to develop not only their problem-solving ability but also their decision-making ability.

intensive care unit in hospitals. In this room, nursing students are encouraged to conduct nursing practice based on given scenarios by university lecturers. A SimMan® manikin patient lies in a hospital bed with a monitor installed overhead to display V/S to reflect the condition given in the scenario. Basic medical and nursing equipment is set up around the bed for easy access. The technology for operating the SimMan® and patient monitor is controlled by the university lecturers in the control room.

- Control Room,

This control room is attached to the simulation room, separated by one-way glass, so that students will not be able to see into the control room while the lecturers in the control room observe the students' performances in the simulation room. In this room, the lecturers control the situations according to the scenarios given to the nursing students using the SimMan® and patient monitor, or through verbal communication using microphones. This room is also equipped with cameras that video record the students' performance.

- Debriefing Room

The debriefing room provides a place where nursing students can discuss their experience of nursing practice after the simulation, guided by lecturers, and is similar to classroom environments. During this discussion, the students are given a chance to watch their recorded performances, which are evaluated by both the lecturer and themselves. Moreover, other nursing students who did not participate in the simulation are also allowed to join in the debriefing session to observe their classmates' recorded performances.

Picture 1. Simulation-based learning (clockwise from top left): A) Control and Simulation rooms, B) One-way glass viewed from simulation room, and C) Debriefing room

5.3.1. Learning process of simulation-based learning

Nursing students indicate that the learning process in SBL has four steps: 1) understanding scenarios, 2) sharing knowledge with other classmates, 3) undertaking nursing practice, and 4) evaluating nursing students' performance. These four steps

occur sequentially for the nursing students. This sequential process is based on scenarios provided to the students, which have been designed by nursing educators, and this process occurs in the security of the university environment.

5.3.1.1. Understanding scenarios of simulation (Understanding scenario)

Nursing students are given a scenario by a university lecturer before undertaking nursing practice in the simulation room. While the period of time given varies, the student is usually informed of the scenario by the lecturer a week before. In the scenario, a mock clinical situation is created such as caring for an asthmatic patient. After being informed of the scenario, the students investigate both the nursing process of the given situation and the nursing theory related to the nursing process as prerequisite learning.

> *Before simulation, a lecturer gives us the information [of the clinical situation]. For example, we are told how the simulation proceeds, the patient's general information and past medical history, and a clinical situation. We are also informed of the learning materials [related to the situation] and the roles we should perform during simulation. Just before simulation, the lecturer also gives us a simple orientation and then we enter the simulation room.* (Bora, Nursing student)

5.3.1.2. Sharing knowledge with other classmates (Sharing)

Individual nursing students are allocated a team for the simulation and they will conduct nursing practice during simulation as a team. Before performing the scenario, all members of the team gather together and conduct a discussion without the lecturer's

guidance about their understanding of the scenario. They share their existing nursing knowledge related to the given scenario with team members and/or they co-construct collective knowledge about the clinical scenario. They also split up the roles in the scenario, rehearse their roles, and then perform as a team during simulation.

> *[After being informed of the scenario,] I discuss the scenario with other members of my team then we split up the roles and decide who will be a charge nurse, a staff nurse and a caregiver. Usually, the lecturer performs the role of a doctor. After sharing the roles, we discuss the management of the given scenario, especially in terms of nursing practice. We would look up information [of the practice] on the internet or textbooks, or share our existing knowledge of the situation with the other members. We prepare our performance of the scenario like this and then enter the simulation room. Our simulation is conducted on the basis of the discussion.* (Dahee, Nursing student)

> *All members gather together earlier and then discuss about the scenario. Sometimes, we have conflicts between us, especially over the prioritisation of nursing practice, but we mostly have similar ideas of the scenario. Like this, we share our knowledge.* (Eunju, Nursing student)

5.3.1.3. Undertaking nursing practice (Practicing)

When the nursing students are ready to conduct their nursing performances, they enter the simulation room and the lecturer begins to control the simulator (i.e., SimMan®) and the patient's monitor to reflect the clinical symptoms according to the scenario. The nursing students then begin to play their roles as allocated and planned during the discussion. During the simulation, the lecturer plays a minimal role (i.e., controlling the simulator and monitor) and only observes the performance. This is because the students should lead and manage all given situations without assistance.

> *When I enter the room, the lecturer presents the [patient's condition] on the patient's monitor. After this, we just conduct our nursing practice as prioritised and then our simulation ends.* (Ari, Nursing student)

I enter the room with all the information and knowledge I have gathered to manage whatever symptoms that might arise [related to the patient's condition]. When the lecturer says, "Let's begin", the patient simulator's clinical symptoms start to change rapidly… So, each member of our team begins to interview the simulated patient to understand the patient's health condition and symptoms, so as to notify the doctor of any issues. After this, we start our nursing practice, after which the patient's situation rapidly becomes worse, and most of the time the simulation ends with us being unable to save the patient. (Dahee, Nursing student)

When I enter the simulation room, I see the [patient's] monitor. When the patient's vitals are presented on the monitor, we respond to it, such as checking blood pressure. If an emergency situation is given, it is also presented in the monitor and we also respond to it. (Hwashin, Nursing student)

5.3.1.4. Evaluating nursing students' performance (Evaluating and reflecting)

When the nursing students' practice in the simulation room is finished, they move to another room, a debriefing room. In this room, the lecturer and the students discuss and evaluate the practice performance based on their recorded performances. Student participation is facilitated in the discussion for the lecturer to conduct collective analysis. Through this evaluation process, the nursing students are able to undergo the process of reflective learning. They review their performance during simulation and receive professional feedback from the lecturer.

I enter the debriefing room and watch the [recorded] video with the lecturer's comments. The lecturer points out our mistakes [such as] "You should have checked the patient's V/S first", or "This practice should have been conducted later". (Eunju, Nursing student)

First of all, the recorded video is played on the screen. I could see the lecturer's comments about our performance on the screen. The lecturer also gives us her feedback, like, "You did this well" or "This was not done well". After this feedback, the lecturer gives us a general review of our performance and nursing practice knowledge, which we write down. Through this process, I can do reflective learning. (Yoonjin, Nursing student)

5.3.2. Influential factors on simulation-based learning

5.3.2.1. Being influenced by interpersonal factors (Factor 1: Interpersonal factors)

During SBL, nursing students are affected by two groups of people – their classmates and university lecturers.

As discussed earlier, the students establish plans of their simulation performances via discussion and sharing of knowledge with classmates who are members of the same team.

> *I don't do the simulation alone, but with friends. When we receive a basic situation [i.e., scenario], each of us prepares for it on our own by searching for relevant information [of the situation]. The lecturer gives us time to discuss and prepare with the other team members before our scenario simulation. We go into rooms and debate about how we will manage the situation… So we search the internet together, exchange our knowledge and finalise what each person shall do [in the simulation]. Like this, we share our understanding with each other and co-construct our collective knowledge.* (Yoonjin, Nursing student)

> *I don't enter the simulation alone. During simulation, an individual doesn't conduct the whole scenario alone, but we divide our roles and then conduct the scenario as a team. So teamwork is really important.* (Bora, Nursing student)

> *It is a process of co-construction. This is because I don't conduct it alone but with others, as a team. Therefore, we can't help but be influenced by each other directly or indirectly… Moreover, cooperation with other students is one of the crucial learning goals [of SBL].* (Hyemin, Nursing student)

As shown above, the students believe that the SBL encourages the co-construction of knowledge with their classmates, and that teamwork plays a vital role in their performance during this learning process.

Although nursing students collaborate and conduct their performance by themselves, lecturers design the SBL, control the simulator, and give the students guidance through

professional feedback of their performance during the final step, ‘evaluating nursing students’ performance’.

> *When we conduct the SBL, we are under the supervision of the lecturer. Especially in the process of feedback, the lecturer teaches us a lot and tells us our mistakes.* (Yoonjin, Nursing student)

> *Our practices are corrected as the lecturer points out the mistakes. I can review my mistakes and I think I will never make the same mistakes again because of her feedback*. (Bora, Nursing student)

5.3.2.2. Being influenced by instructional factors (Factor 2: Instructional factors)

Instructional methods also influence nursing students’ learning during simulation. As the SBL is designed to develop nursing students’ competencies of nursing practice, the students are given enough opportunities to conduct nursing practice with simulators, in contrast to clinical placements. Moreover, they are encouraged to utilise and apply their existing knowledge to the simulator in environments that resemble real clinical environments.

> *We can personally do [nursing practice] during simulation. We can do the things that we are not allowed to do in clinical environments together.* (Dahee, Nursing student)

> *Through the simulation, I can get chances to do nursing practice such as fundamental nursing practice and medications. In addition, I have not been able educate patients as a nursing student [during clinical placements] but [through simulation] I can learn how to explain things to patients.* (Ari, Nursing student)

> *During SBL, I can perform the duties of registered nurses, which I can’t do during clinical placements. If there is no SBL, I would only be able to learn those skills after becoming a nurse with insufficient experience.* (Garam, Nursing student)

However, they are required to lead their performances of nursing practice themselves

without any guidance from the lecturer. It means that SBL is used to facilitate self-directed learning.

> *In the classroom, I just sit down on a chair all day, but I have to play a leading role in SBL.* (Yoonjin, Nursing student)
>
> *The great advantage of SBL is that I try to do [nursing practice] independently, like a real nurse.* (Bora, Nursing student)
>
> *The students can lead their own learning during simulation and correct their practice through SBL.* (Jongwon, University lecturer)

Moreover, reflective learning is facilitated during the last evaluation process as the students watch their recorded performance on a screen and receive feedback from the lecturer.

> *[This SBL] can be called 'reflective learning'. I can reflect on my mistakes, like, "That was good" or "That was wrong" while watching my performance*. (Eunju, Nursing student)
>
> *Sometimes I think "I shouldn't do it like this" during simulation. Although I know [how to do it], when I actually do it there are times I make mistakes. For example, I had a plan to check this but when it actually happens… You know it yourself. I learn from my mistakes, so that when I deal with real patients I will not do it again.* (Bora, Nursing student)
>
> *When they make mistakes during simulation, they will be given other chances to modify their mistakes. It is the advantage of SBL as they can repeat their practice until they learn… After conducting nursing practice, they have a chance to express their opinions during debriefing time. The simulation would take 5-10 minutes, but the debriefing takes around 50 minutes. So they can reflect and know what to do next time.* (Jongwon, University lecturer)

5.3.2.3. Being influenced by environmental factors (Factor 3: Environmental factors)

Notwithstanding the place where the SBL takes place is in universities, the simulation laboratories are designed to be the same as clinical environments (as is shown in

Picture 1). This is because the learning goal is to increase the nursing students' sense of reality in the SBL environment.

> *When I enter the simulation room, the atmosphere of the room is similar to the clinical environments... I think all the things usually found in the clinical environments are equipped within the room such as cardiopulmonary resuscitation tools, nursing carts, telephones, and computers.* (Hwashin, Nursing student)

Moreover, ICT devices play a critical role in the SBL such as the simulator in the simulation room, and the computer-based systems and recording devices in the control room.

> *Everything including the simulator is ICT… As you know, the simulator is not a real human but ICT. So, ICT plays a leading role in how we obtain information and build knowledge [during simulation].* (Garam, Nursing student)
>
> *During the SBL, ICT plays a main role, as the simulator is ICT. In simulation preparation, it plays an accessory role.* (Yoonjin, Nursing student)

As discussed in *5.3.2.2. Instructional factors*, the education using the simulator has brought many positive effects to the nursing students' learning, such as facilitating self-directed and reflective learning. However, this education also has its own limitations. SBL is conducted in mock clinical environments and an ICT-based simulator replaces the patient in these environments. In other words, the simulation environments are not completely realistic, although the environments are designed to be the same as the clinical environments. For example, nursing students cannot communicate with the simulator as they would with a real patient, but rather they have to pretend to communicate with the simulator.

> *It is hard when there are no real reactions from the simulator. I only talk at the simulator… The disadvantage is that there is no [two-way] communication.* (Hwashin, Nursing student)

The simulator cannot show real human reactions. The disadvantage is that the simulator is just a machine... When I check the simulator's V/S, I have to find the exact points where the sensors are located. In other words, it is disadvantageous that I have to adjust and conduct my nursing practice according to the characteristics of a machine, and not a real person's body. (Yoonjin, Nursing student)

The disadvantage is that I feel the machine doesn't seem like a human. So, it is unrealistic. During clinical placements, I can observe real situations. However, I conduct my nursing practice to a manikin in SBL. Moreover, the simulation environment is different from the clinical environment. So, I feel there are limitations to applying the learning from simulation to the clinical contexts. (Bora, Nursing student)

The problem with SBL is that the students can't develop empathy towards the simulator as they would with a real person, because they regard the simulator as a doll. The disadvantage with this is that the students would believe that because it is a computer, they could easily undo their mistakes. So, they are not careful with their practice. (Jongwon, University lecturer)

If the simulator was a real patient, the students would be more careful. But, they are conscious of the fact that it is just a doll. So they don't feel any tension [about their nursing practice during simulation]. If they make any mistake after becoming a nurse like that, they would be immediately dismissed. I have tried to make the simulation as real as possible. But it is difficult. (Hyori, University lecturer)

It has been explained above that the SBL enables nursing students to have enough opportunities for nursing practice. However, in practice, nursing practice during simulation does not completely support detailed nursing practice due to the limitation of the simulator being a machine, and not a real person. Rather, SBL is more likely to offer nursing practice experience in terms of the role of nurses (i.e., a role play). As Yoonjin asserts, she pretends to check V/S by activating the sensor for V/S, and not check real V/S as she would on clinical placements. Dahee, a nursing student, also supports the Yoonjin's quotation:

I don't know whether it is cyanosis or not, because the simulator is not human. So, it is really hard to pick up clinical signs [from the simulator]. When I need to do an intravenous injection, I just need to touch the syringe to the simulator for it to be recognised by the sensors… When I am required to check the blood pressure, I just need to roughly tie the cuff [around the simulator's arm], then the machine

automatically recognises it. So, it is hard to conduct nursing practice in a detailed manner. (Dahee, Nursing student)

5.3.2.4. Being influenced by emotional factors (Factor 4: Emotional factors)

It is identified that nursing students do not feel heavy emotional burdens from SBL, compared to clinical placements. This could be due to the belief that they are in a safe place, their university. It would be obvious that they are familiar with the university environments and have built strong rapport with classmates and the lecturers.

I don't get stressed [during SBL] as much as I do in clinical environments. This is because I know everyone, so I don't need to study nunchi much. (Yoonjin, Nursing student)

Nevertheless, they feel uncomfortable emotionally due to the one-way glass in the simulation room. The lecturer is able to observe the nursing students' performances in the control room via the glass, but the students are not allowed to see the lecturer. Thus, the students get stressed as they feel they are being watched by the lecturer.

I get stressed as I am getting evaluated by the lecturer [in the control room]. (Bora, Nursing student)

We are in this closed space and the lecturer watches us through this one-way window. I feel more nervous and I feel oppressed because of the feeling of being stuck in this room. Although I can't see, I know that someone is watching me… it makes me anxious. (Hwashin, Nursing student)

5.3.3. Nursing students' response to the four influential factors.

It has been identified that nursing students have more positive attitudes towards SBL than learning during clinical placements. Accordingly, they present more positive than

negative responses towards SBL. Nursing students are interested in the fact that they are able to play a leading role in the SBL and have experience of nursing practice, although it is a mock situation (i.e. a scenario).

> *Simulation is interesting. When we respond actively and offer proper interventions, the simulator's condition changes and improves. I find that interesting… I just sit on a chair in classrooms, but I can take control of my learning during simulation. Such things are interesting.* (Yoonjin, Nursing student)

> *Through SBL, I feel that my abilities are lacking. This feeling makes me study harder. I really feel motivated and interested [through this learning].* (Eunju, Nursing student)

Moreover, the students do not get emotionally stressed during SBL as much as they do on clinical placements, as demonstrated in *5.3.2.4. Emotional factors*, notwithstanding they get stressed by being evaluated. Similarly, the influence of nunchi during this learning is much lesser than clinical placements.

> *During simulation, the power of a higher social position is minimal between the lecturer and us. So, we feel respected. In this atmosphere, we can conduct more active and self-directed learning. We get less stressed out.* (Ari, Nursing student)

> *I study nunchi much lesser [than clinical environments]. I can't say there is no nunchi during simulation because we are being evaluated, but it is much lesser.* (Eunju, Nursing student)

As the students study less nunchi and actively lead their study themselves, they can increase their confidence of nursing practice in clinical environments via SBL.

> *If I experienced the situation of endotracheal intubation during simulation, I may know which tools I should prepare and how to do [nursing practice]. If I am placed in the real situation, I feel like I am confident enough to manage the situation. If I am given any task, I feel I can do it.* (Bora, Nursing student)

> *[After simulation], I feel like I will be able to confidently conduct nursing practice when I meet real patients… The more I practice, the more confident I become.* (Hwashin, Nursing student)

On the other hand, nursing students also have a sceptical view of SBL as they undertake nursing practice on a simulator rather than on real human patients. That is to say they are struggling with the lack of realism with the simulator. This aspect is the most serious issue for SBL. Due to this issue, the students would have difficulty in applying the knowledge obtained from simulation to clinical placements.

> *We just apply [our practice] to a doll, pretending to do [nursing practice] rather than actually doing it, so I don't think my skills have improved. Above all, it is not a real situation. I feel it is not realistic enough. Moreover, [the simulator] doesn't have any feelings, so it doesn't complain of pain. Therefore, I end up handling the simulator harshly… I hope I can have a real chance to [try nursing practice such as] intravenous injection to a real person's arm.* (Sarang, Nursing student)
>
> *The patient [i.e., simulator] doesn't really die, so I don't feel like it is a real, urgent context. Moreover, if the patient dies during simulation, I don't feel sad… There is a limitation to applying what I have learnt [from simulation] to clinical placements.* (Bora, Nursing student)
>
> *I perform the simulation on the supposition that the simulator is a human, but I may subconsciously think it is not a human. So, I can't empathise at all.* (Sua, Nursing student)

5.3.4. Conclusion of the simulation-based learning

Nursing students are given opportunities to undertake nursing practice during SBL in mock clinical environments located within the familiar surroundings of their university. Through SBL, they are able to experience more nursing practice than in clinical environments, particularly hands-on, direct experiences of nursing practice. The SBL learning process has four sequential steps (i.e., understanding scenarios, sharing knowledge with other classmates, undertaking nursing practice and evaluating nursing students' performance) and this process is affected by four factors (i.e., interpersonal, instructional, environmental, emotional factors).

The key educational facts of SBL are that it facilitates self-directed and reflective learning. Nursing students are given chances to perform nursing roles during self-directed learning, and their performances are reviewed through the evaluation process and facilitated reflective learning. Although they are given the chances to simulate it, it would be impossible to perfectly perform the same nurses' duties as a student. That is to say, SBL includes an educational method of learning from mistakes as reflective learning.

To summarise, the nursing students who participated in this research are mostly positive towards SBL. They are interested in the self-directed and reflective nature of learning in SBL, which is unique in comparison to the clinical environments and the education in traditional university environments. Moreover, they are less emotionally burdened due to reduced influence of nunchi on their learning than when in clinical environments. The students also gain confidence in their nursing practice skills via simulation. However, they believe that the lack of human touch creates an unrealistic experience and they therefore are less able to transfer their skills to the clinical setting. These are concerns that should be tackled.

5.4. Classroom learning in nursing education

During the four year nursing course, nursing students spend the most time in classroom environments. These environments and the methods of education are not too different from the education they received during primary and secondary schools. The students believe the aim of this classroom education is to learn the nursing theory that forms

the basis for nursing practice, and the practice itself, which is the application of theory.

> *Our university mainly teaches us theoretical nursing knowledge and the nursing practice based on that knowledge.* (Sori, Nursing student)

Moreover, they also believe that the education from classrooms offer the foundation knowledge to all areas of nursing.

> *All of the learning from classrooms is important, because that learning becomes the foundation [for our practice]. So I can't ignore it.* (Wanki, Nursing student)

> *Of course classes are important. When students want to understand the patient's condition, it would be easier that they have an understanding of the theoretical background [of the disease]. In other words, classroom learning is essential for obtaining preliminary knowledge.* (Hyori, University lecturer)

Nursing education in the classrooms, which is mostly operated by the lecture method of instruction, takes place in conventional environments equipped with desks, chairs and a black or white board. However, nowadays the environments are supported by many assistive technology devices such as laptops and projectors due to the development of ICT.

> *In classrooms, there are desks, chairs and white boards. The university lecturer's desk is located in the front. On this desk, a laptop, projector, and microphone are available and set up as most lectures use PowerPoint presentations for teaching.* (Sori, Nursing student)

Picture 2. A typical university classroom in Korea

5.4.1. Learning process of classroom learning

Education for nursing students in classrooms occurs through three sequential steps, 1) receiving nursing information, 2) building nursing knowledge and 3) evaluating nursing students' knowledge. Bora, a nursing student, simply presents these three steps as below:

> *I listen to the lectures and study its contents on my own. Then, I take exams based on my study.* (Bora, Nursing student)

5.4.1.1. Receiving nursing information (Receiving)

As the first step, nursing students take part in the lecture method of teaching, which is delivered by lecturers and is teacher-centred. This educational method usually involves the lecturers giving nursing students information and the students receive the information passively rather than interactively.

> *I just receive what the lecturers give me.* (Garam, Nursing student)
>
> *During lectures in classrooms, lecturers just deliver [nursing] information to us*

one-sidedly. (Hyemin, Nursing student)

Lectures in classrooms are for us to just sit down and listen with our textbooks. So it doesn't occur to us that we should do anything actively. (Wanki, Nursing student)

5.4.1.2. Building nursing knowledge (Studying)

After attending lectures, nursing students continue the process of knowledge building, which is 'their own' (i.e., subjective), based on the passively-received information. In this process, which is dependent on their motivation, students mainly memorise information, and attempt to understand that information (i.e., the deciding process, see *4.3. Process of knowledge building*)

For the lectures, I have to memorise [nursing information] rather than understand so I do that first. If I feel it is necessary to understand, I try to understand. It is also depends on my interests. For example, I find mental health nursing very interesting. But, my friends hate mental health nursing the most, so for the exam, they just memorise the information [rather than understand it]. (Dahee, Nursing student)

Memorisation! I revise the information I learned in classrooms. I try to memorise the lecture material with nursing textbooks. (Wanki, Nursing student)

In my case, I read all the handouts given by the lecturers and then I repeatedly read the handouts from beginning to end until I can memorise it all… So that I can get the information to stick in my brain. (Yoonjin, Nursing student)

5.4.1.3. Evaluating nursing students' knowledge (Evaluating)

Nursing students' knowledge that has been built from received nursing information is evaluated in this last step of classroom education. The students believe that the priority of their education is to get good marks in their examinations. Hence, this step is a vital step for the students.

Eventually, I have to take exams. I should study for the sake of becoming a better nurse, but instead, I currently study for the sake of achieving high exam marks. (Dahee, Nursing student)

When I finish studying all nursing subjects [i.e., memorisation], I take midterm and final exams based on those contents, and in between I have to take quizzes. I think studying nursing involves constant preparation for exams. (Yoonjin, Nursing student)

I read textbooks. After reading the textbook once, I also read the handouts from lecturers. With these, I try to summarise the information and then decide whether I will memorise or understand the information. I also solve questions in the workbooks. This is how I study [during the learning from classrooms]. In other words, I am preparing for exams. (Sarang, Nursing student)

In this section, it has been identified that nursing students are educated over three steps during classroom learning. Classroom education offers the theoretical background knowledge for clinical placements and SBL.

I think the contents of lectures are the main sources of my knowledge. (Dahee, Nursing student)

5.4.2. Influential factors on classroom learning

5.4.2.1. Being influenced by interpersonal factors (Factor 1: Interpersonal factors)

Insofar as is demonstrated in the step of receiving information, the conventional pedagogical method in the classroom environments is that of lectures delivered by university lecturers. Moreover, the design of the instructional method and evaluation of the students' knowledge from classrooms are carried out by the lecturers. Therefore, the roles of the lecturers in classrooms are crucial. In the environments where one-way transmission of nursing information from lecturers occur, influence from others such as classmates is naturally limited, whereas the lecturers' influences are accordingly

robust on the students' learning.

> *I am influenced by the university lecturers' method of education. If the lecturers teach us in an interesting manner, I get motivated and want to study more.* (Hyemin, Nursing student)

> *University lecturers influence my study in classrooms. When the lecture is matched well with textbooks or handouts, I can remember what I learn in class longer. However, if the lecturers change the contents of the PowerPoint slides, don't give us any handouts, and teach us too quickly, I will be very confused. So, the role of lecturers is important.* (Sarang, Nursing student)

5.4.2.2. Being influenced by instructional factors (Factor 2: Instructional factors)

As nursing students mostly obtain nursing information from lecturers in classrooms passively, their attitudes towards learning are passive. It means they absorb the information without critical thinking.

> *During lectures, I only receive the lectures for obtaining information. It is true that I have lesser chances to be active during learning, because there are many lectures.* (Sua, Nursing student)

> *In school, I sit down during all the lectures, and when the university lecturers explain and give us the information, I just need to write it all down.* (Eunju, Nursing student)

> *A lecture is a passive way of cramming us with information.* (Sori, Nursing student)

> *As nursing students have to take a national exam [to become a licensed nurse], to some extent, using the rote learning method in education would be convenient to obtain a certain level of knowledge… The subjects that require a lot of memorisation, such as nursing studies, mostly use the rote learning method… It would be better to develop an interactive educational method [in nursing studies], but it still seems [we are] far from it.* (Jongwon, University lecturer)

> *In Korea, education within the classroom is often one-way. Yes, it is the cramming educational method. At least during clinical placements, nursing students are given the freedom and time for critical thinking, but in the classroom, not only is the time given to learn the theory limited, the quantity [of things they have to learn] is large. So there is no other way but to use the rote learning method.* (Hyori, University lecturer)

One of the main reasons for one-way transmission of information to the students is the large amount of nursing knowledge that the student needs to learn in classrooms. Moreover, nursing education includes clinical placements as an essential part of curriculum, thus the time available to be educated in classrooms is limited. As time is tight in which the students have to receive their course material, the lecturers tend to deliver their lectures quickly.

> *Although the university lecturer prepares photos [related to nursing], the lecture runs ppalli-ppalli because we have no time to waste. The progress of lecture is too fast, so it is difficult to revise the lectures… The amount of the things to be revised from the lectures is too much for me, so I don't have enough time to explore extra information. [It means] I can't do in-depth learning.* (Sarang, Nursing student)

> *I don't ask any questions during lectures. Other students are also the same as me. We are too busy trying to get through our lectures. If we ask any questions, our lectures will be delayed. So, we don't ask… We are too busy. Because of clinical placements, we have to learn everything within 8 weeks during a semester… So the university lecturer would say, "We don't have time to waste. We should progress our lectures quickly. We have a long way to go."* (Yoonjin, Nursing student)

> *As nursing is a field of study that requires a large amount of knowledge, I think we shouldn't say that the rote learning method is necessarily bad. If we do not utilise it, the students won't be able to obtain all the information they require due to class time restrictions.* (Jongwon, University lecturer)

> *There are a lot of things I should teach the students, but the class hours are too short… If a nursing student dozes off during class, the student will miss a lot of things from the lecture as it progresses quickly. Then, I will worry about whether the student can study on his/her own or not.* (Hyori, University lecturer)

In order to manage a large amount of nursing information, students build nursing knowledge by relying on the memorisation of the contents of lectures and nursing textbooks (the second step). This built knowledge is evaluated during the exams (the third step). However, learning via memorisation produces the lowest level of knowledge (the first level of knowledge) as demonstrated in Chapter Four. The memorised knowledge for exams remains in the short-term memory. Thus, the students

have difficulty recalling the knowledge as it stays in their mind only briefly.

> *Honestly, I can't remember [the learning from classrooms] well. During my clinical placements, I can't easily recall what I have learnt in the classroom.* (Bora, Nursing student)

> *When I was in third year, I learned about the digestive system. Now, my friends and I would say, "I can't remember any of what I learnt then anymore". That is why we are worried about taking the national examination to become a registered nurse.* (Yoonjin, Nursing student)

> *What I learn in the classrooms doesn't remain in my long-term memory. I have learnt a lot [from the classrooms], but I can only recall a few things now.* (Eunju, Nursing student)

Nursing students consider exam results important. As the socio-cultural factors were introduced in the *5.2.2.2. Socio-cultural factors*, a hierarchical society exists in Korea. Students compete against other students in order to gain a better position in society. Thus, achievement of good marks in the exams is an objective indicator of a decent future career.

> *I have to get good marks to find a job in a big hospital. So, the exams are very important… I hope my juniors don't study just for the exams like I do.* (Dahee, Nursing student)

5.4.2.3. Being influenced by environmental factors (Factor 3: Environmental factors)

The classroom environments in nursing schools are very familiar to nursing students. They have been exposed to such environments since they were 6 years old.

> *The classroom environment is a very familiar and free space for me.* (Bora, Nursing student)

Moreover, they share the environments with classmates and the lecturers who have

high rapport with them (see *5.2.2.1. Interpersonal factors*). Within contexts of the environments, the students believe they are supported and thus they are more able to receive education in a casual, friendly and harmonious atmosphere.

> *Because I am with my friends [in classrooms], I feel encouraged to study because of them even when I am exhausted during exam time.* (Ari, Nursing student)
>
> *The classroom environments are friendly and harmonious for me.* (Sori, Nursing student)

At the same time, universities are the environments where the students' education is prioritised, in contrast to clinical environments. Therefore, they can concentrate more on their learning in the classroom environments than in clinical environments.

> *The purpose of schools is entirely for student education. Schools are the organisations that support and encourage students for their learning.* (Hyemin, Nursing student)

5.4.2.4. Being influenced by emotional factors (Factor 4: Emotional factors)

It is verified that nursing students do not get as emotionally stressed in classrooms as compared to clinical placements, similar to SBL.

> *I feel more comfortable to learn in classrooms, because I get emotionally stressed in clinical contexts.* (Hyemin, Nursing student)

Insofar as discussed in the environmental factors, the students feel an emotional sense of stability due to the familiarity they feel with the environment and context.

> *I know all university lecturers, so I can make eye contact with them. Moreover, my close friends are studying beside me. So I feel stable.* (Kuntaek, Nursing student)

Moreover, the students feel lesser emotional burdens, because they understand what

their roles are in the classrooms, and they believe that the environments are predictable. That is to say that the issue of uncertainty within the environment is resolved.

> *[In comparison to clinical contexts,] I don't have any experience of being embarrassed in classrooms.* (Wanki, Nursing student)
>
> *After all, I pay my school for my learning, so the university lecturers don't create a pressurising environment for us. There are also many students who are in the same position as me. So, I don't get stressed much, because the schools' reason for existence is to teach and I go there to learn.* (Sarang, Nursing student)
>
> *I just sit and listen to the lectures in classrooms, so I don't get stressed out much. I just have to go in to receive my due education.* (Dahee, Nursing student)

Dahee and Sarang believe that they have a right to receive education in classrooms. Therefore, they have less emotional burdens compared to their experience in clinical environments.

5.4.3. Nursing students' response to the four influential factors

It is evident that nursing students feel more secure in classroom contexts than other contexts, especially clinical contexts. For this reason, they are less burdened by external factors and feel comfortable.

> *In the clinical contexts, I struggle with many difficulties alone, so, I feel more comfortable to study in classrooms.* (Ari, Nursing student)
>
> *I really feel comfortable studying in classrooms, compared to studying in clinical environments].* (Garam, Nursing student)

Furthermore, the students express their confidence towards their behaviours in classrooms.

> *I am not afraid. I am not a child. I can do whatever I want when learning in classrooms. If I want to listen [to the lecture], I'll listen. I have that freedom so I don't feel burdened. I behave confidently [in classrooms].* (Sarang, Nursing

student)

In an atmosphere familiar to the students, it is identified that they study nunchi less, as in SBL. In particular, they feel the burdens from the social hierarchy less in the classroom contexts. The hierarchy is the main cause of nunchi (see *5.2.3.2. Using nunchi mechanism*).

> *I don't study nunchi [in classrooms]. I feel comfortable in classrooms. This is because there is no strict distinction between eul and gab in classrooms… Clinical placements will require more nunchi. If the amount of nunchi required on clinical placements is fifty, then in classrooms I will need ten or twenty.* (Yoonjin, Nursing student)

> *Whether there is anyone I should study nunchi for or not [influences my learning]. Everyone in class is my friend, and the university lecturers don't pressure us.* (Bora, Nursing student)

> *I have never thought of studying nunchi in classrooms.* (Wanki, Nursing student)

As Yoonjin points out, it does not mean that they do not study nunchi at all. They also have the burdens of being evaluated, thus they study the lecturers' nunchi as the lecturers are their evaluators. However, it is obvious they study nunchi much less than in clinical contexts.

> *Sometimes, I study nunchi with the university lecturers, because [I am concerned] of my marks…* (Bora, Nursing student)

5.4.4. Conclusion of the classroom learning

Nursing students learn nursing theory and its practice in classroom contexts and believe that this type of learning is the foundation for their nursing knowledge. In the

classroom context, students learn through a process of three steps (i.e., receiving nursing information, building nursing knowledge and evaluation of nursing students' knowledge). During this process, existing knowledge can be reflected upon. This process is affected by the four influential factors, such as interpersonal, instructional, environmental, emotional factors. In the interpersonal factors (Factor 1: Interpersonal factors), university lecturers are the most influential group of people. This is due to the educational methods employed in the classroom (Factor 2: Instructional factors). The method is a one-way education delivery from the lecturer to nursing students. Therefore, there is no doubt that the lecturer is influential in the students' learning and the students learn passively in classrooms. The reason for using the one-way teaching method can be observed as an educational custom in Korea, but the identified reason in this research is the large amount of nursing information that the student has to learn within the classroom, as well as the limited time available to transmit the information to the students. In this instructional context, the students mainly use the method of memorisation to build their knowledge, based on the information provided. This is because their goal is to get good marks during exams and they believe that memorising large amounts of information in a short period of time is necessary to achieve this. The nursing students are comfortable in and familiar with the classroom environments (Factor 3: Environmental factors) and they are emotionally stable in the environments (Factor 4: Emotional factors). In the classroom context where the three-step-process and the four influential factors exist, the students reported to feel secure and study nunchi less. Moreover, they are confident regarding their behaviour in the classroom context.

As the students' response has been discussed above, they have positive attitudes toward

the learning in classrooms, compared to clinical placements. Their attitudes are similar to the SBL. However, their responses with regards to classroom and clinical environments should be assessed as relative viewpoints. This means that the students' positive attitudes towards classroom environments can be understood as a consequence of their experiences and attitudes towards clinical environments. Moreover, it does not mean that classroom learning is a better educational method than learning in clinical environments. In particular, the students mainly use the memorisation method in order to build nursing knowledge. Memorisation of information is the lowest level of knowledge as discussed in Chapter Four. Therefore, nursing educators in Korea need to explore better educational methods for building higher levels of knowledge in the classroom environment, while taking into account the large amount of nursing information that needs to be delivered and the limited time available.

5.5. Relationship between the three environments

5.5.1. Comparison of influential factors between the three environments

In this chapter, nursing students' learning processes, influential factors on the processes and their responses towards the factors in the three educational environments in nursing studies have been explored. In the next section, relationships and comparisons between the three environments will hence be discussed. First of all, the influential factors of the three environments, as demonstrated in the former sections, will be compared.

- Interpersonal factors

Different groups of people were found to influence the students' learning in each environment. 1) Nurses who educate nursing students in clinical environments, 2) classmates who co-construct nursing knowledge and university lecturers who manage the education in simulation environments, and 3) the university lecturers who give the students lectures in classrooms are the most influential persons on the students' learning. It means that the main groups of people who lead nursing students' education are influential as they directly engage the students for knowledge building in nursing studies.

- Socio-cultural factors

Three feature of Korean cultures were introduced in *5.2. Learning during clinical placements*. Amongst the six factors influencing student learning in clinical environments, this socio-cultural aspect that underlies the interpersonal factors is one of the most powerful factors. Due to the socio-cultural factors, especially social hierarchy, nursing students use the negative nunchi mechanism and this nunchi disturbs the students' in-depth learning during clinical placements. Although the students' discussions of these factors were rare in the university environments, this social hierarchy is deeply grounded in all environments and inevitably influences the students' learning. As was demonstrated earlier, the influence of emotional burdens, caused by the social hierarchy, on the students' learning is limited in the classroom and simulation environments, but the students still have emotional burdens of being evaluated in those environments. Moreover, the students have a strong desire to achieve higher marks than their peers in academic tests by relying on the knowledge

building method of memorisation. This phenomenon can be related to the social hierarchy. By doing better than their peers, they would have better chances to take higher social positions in this competitive and hierarchical Korean society. Thus, higher achievements in education can become a tool that enables people to elevate their social position in the hierarchical Korean society, and this competitive atmosphere in Korea influences learning in all the three environments.

> *Compared to other countries, Koreans think they should always be superior to other Koreans and always stay a step ahead of the others… So, it is extremely competitive.* (Sunja, Nurse)

- Instructional factors

Different instructional methods are carried out in each environment. If the instructional goal of clinical placements is to construct empirical knowledge of nursing practice, the goal of the classroom learning is to construct theoretical knowledge of nursing practice. However, nursing instruction in clinical environments is not systematically established (e.g., the lack of standard guidelines of nursing education in clinical environments). Furthermore, nursing students have difficulty learning and applying nursing practice during clinical placements as they are mostly only allowed to observe. Thus, SBL was introduced to nursing education as an instructional strategy that allows nursing students to directly experience nursing practice. In this learning, the students are able to conduct self-directed and reflective learning, compared to the education in classrooms, which uses a one-way instruction of nursing theory (i.e., passive instruction).

Namely, the students can learn nursing practice in clinical and simulation

environments, and nursing theory in classrooms.

- Environmental factors

In the instructional classification above, learning in clinical placements and SBL are compared with the learning in classrooms. For environmental classification, the three environments can be classified as clinical environments versus university environments (i.e., simulation and classroom environments). The clinical environment does not exist solely for the nursing students' education, but rather mainly for patients' care. It means that the environmental classification is divided as non-student-focused (i.e., clinical placements) versus student-focused (i.e., simulation and classroom learning) environments. Therefore, the clinical environment is one where nursing students have difficulties in building nursing knowledge due to several reasons, such as the busyness of clinical environments, differences of nursing practice between hospitals, and patients' safety. In particular, the short period of time students are allocated to each ward, as an instructional factor, causes the nursing students' difficulty in adjusting to their clinical placements. In contrast, the students are more familiar with the educational environments in universities.

- Emotional factors

Nursing students get stressed with complex emotions in the unfamiliar clinical environments due to the circumstances of the lack of systematic education, their lower social position, their unclear roles and low rapport with the nurses. Particularly, these emotional burdens are connected to the nunchi mechanism and this mechanism adds more emotional burdens. Meanwhile, nursing students feel relatively secure in the university environments due to greater certainty of their roles, familiar environments

and higher levels of rapport with other persons.

- Physical factors

As nursing students believe the clinical environments are unfamiliar and they are required to adjust to a different lifestyle pattern during clinical placements, they experience physical difficulties along with the emotional one. It is identified that the emotional burdens are closely related to these physical burdens. However, the students do not report any physical burdens in university environments. This would be because of the students' emotional stability and fewer physical activities in the university environments.

In this research, it has been discovered that nursing students' rapport with other persons play a critical role in nursing education and this rapport influences all of the above factors in the three environments. That is, the level of nursing students' rapport with other persons who are around them can have a positive effect on their learning. For example, nursing students' responses towards education are positive in simulation and classroom environments where they have higher rapport with the environments and persons, who are classmates and university lecturers. In contrast, they have difficulties learning in clinical environments where they feel unfamiliar in and have lower rapport with the nurses. When they become used to the clinical environments and build more rapport with the nurses, those difficulties can be reduced and the learning in those environments becomes more useful. However, one of the serious concerns is that the period of clinical placements is too short to get used to the environments.

Meanwhile, the three environments where four or six factors influence nursing students' learning in complex ways can also be classified by the students' attitudes

towards learning, namely active versus passive learning. The students are only allowed to conduct their own nursing education (e.g., observation and nursing practice) with the nurses' permission or supervision during clinical placements, hence their behaviour and learning are restricted. Therefore, their attitudes are mostly passive.

> *I think I am passive [during clinical placements]. If a nurse explains, "This is A," while following the nurse, it goes in through one ear and out the other… Especially, if I don't have any prior knowledge, I just passively observe the nurses' practice without critical thinking.* (Dahee, Nursing student)
>
> *As we mainly observe nurses' practice, we are passive learners [in clinical environments]. However, if we have successful nunchi, we can be active* learners. (Hwashin, Nursing student)

Classroom learning also makes nursing students passive by using the one-way teaching method i.e., lecturers.

> *Classrooms are passive environments. I only receive things from lecturers.* (Ari, Nursing student)
>
> *A lecture is a passive way of cramming us with information.* (Sori, Nursing student)
>
> *It is true that I have lesser chances to be active during learning, because there are many lectures in the school.* (Sua, Nursing student)

In contrast, nursing students are required to be active during SBL. This is because they need to understand the simulation scenarios, plan their nursing performance, and put this plan into action themselves.

> *I think SBL is an active learning method.* (Wanki, Nursing student)
>
> *The SBL is the education in which we should lead, so we should conduct this learning actively. In particular, based on the given scenarios, we should make our own decisions on our practice and carry them out ourselves.* (Yoonjin, Nursing student)

In the earlier sections, it has been discussed that nursing students' active attitudes are

beneficial to their nursing knowledge building. In particular, it is demonstrated in the clinical placements section that they can have active attitudes in accordance with the students' nunchi mechanism. Their positive nunchi in clinical environments facilitates their active attitudes towards learning.

> *For example, during clinical placements, when I have a question, studying nunchi to ask it or trying to solve the question myself, can be considered as active learning. On the other hand, simply following the nurses around blankly or standing next to the wall and staring into space, would be considered as passive learning.* (Yoonjin, Nursing student)

Moreover, nursing students assert that if the students have more prior knowledge, the students can be more active in clinical placements. Although observation is the main learning method in clinical environments, they believe that they are able to actively reflect on their existing prior knowledge (i.e., cognitive process).

> *If I don't have prior knowledge, I just follow the protocol I am given. However, if I have prior knowledge I am able to reflect on what I know, and apply some of my own judgement [to my practice].* (Sua, Nursing student)

Similar to this active cognitive process, if they have the mindset to be active and enthusiastic about their learning, nursing students believe it will have a positive effect on learning in classrooms, although the classroom contexts are passive.

> *I am more passive in classrooms, but I try to keep my mind active for knowledge building. For better learning, especially in passive environments, I think it would important to have the active mind [for learning].* (Kuntaek, Nursing student)

As was argued in Chapter Four, it is vital to actively connect obtained information and decide which information to accept for knowledge building. In addition, active application of prior knowledge should take place in order to build higher knowledge (i.e., the third level knowledge). As Kuntaek indicates above, active learning can be

enabled by nursing students' attitudes in passive learning environments, although the students are still influenced by the main educational methods in the three environments.

5.5.2. Scope of nursing education in three environments

As was discussed earlier, university lecturers offer nursing information including 'nursing theory and its practice', to nursing students during classroom learning and the students attempt to absorb that information. Meanwhile, the students are able to have direct or indirect experiences of 'nursing practice' in clinical and simulation environments.

Nursing students learn a large amount of nursing theory covering a wide scope of nursing education during classroom teaching. In contrast, clinical placements largely focus on the education of nursing practice and nurses' duties, covering a narrower scope of nursing education. Thus, the nursing students cannot obtain as much nursing information in clinical environments as in classroom environments. Moreover, the students cannot attend clinical placements in all clinical wards, thus the information they can obtain is limited compared to classroom learning.

> *I think I can learn a lot during classroom learning [rather than on clinical placements]. For example, when I learn about a disease, I can also learn its pathologic physiology and all its clinical symptoms in classrooms. On clinical placements I learn about the nurses' practice and their processes.* (Eunju, Nursing student)
>
> *I think where I can efficiently learn more is in the clinical environment, but the place where I can get more nursing information is classrooms.* (Wanki, Nursing student)
>
> *The amount of background information that I can obtain is obviously larger in classroom learning. This is because the lecturers teach us everything about nursing in detail.* (Sori, Nursing student)

In the comparison of the educational scope between clinical placements and simulation, it is identified that the scope of clinical placements is wider than that of simulation. During clinical placements, nursing students can experience real clinical contexts as well as diverse cases of diseases, but they conduct their simulation by focusing on specific nursing practice and specific cases of diseases. Therefore, the number of disease cases and nursing situations during SBL are inevitably fewer than learning in clinical environments.

> *We learn about one disease, as well as its symptoms, during each SBL session. However, patients in clinical environments don't have only one disease, but have multiple morbidities with their diverse symptoms, and might have developed complications. Therefore, we are required to have more insightful viewpoints [of nursing]*. (Sua, Nursing student)

> *When I visit a ward, I could learn general things about the ward. However, I could learn specific and specialised things about a ward during simulation… During clinical placements, there are diverse cases in one place, but only one case is explored during simulation.* (Yoonjin, Nursing student)

> *During simulation, we are trained with emergency clinical scenarios such as cardiopulmonary resuscitation, but I couldn't experience the situation in clinical environments... During each simulation class, I can see only one case and I don't learn simulation every day. However, during clinical placements, I can meet many patients and see many cases in a short period of time and in one single place. I can have diverse experiences during clinical placements [more than simulation]*. (Hwashin, Nursing student)

As it can be deduced from the above, classroom learning offers the widest scope of nursing education and SBL offers the narrowest scope. It can also be interpreted that the classroom offers general information of nursing and the SBL offers the chance to learn nursing in detail by focusing on specific topics of nursing education.

5.5.3. Experience in nursing education

If it is assumed that all of one person's actions form his/her experience, that person's learning process can be included in the experience. Nursing students have learning experiences in the three environments. These students' experiences can be divided into two types of experience, namely live experience and non-live experience. Nursing students can directly or indirectly learn about nursing as live experience of nursing during SBL and clinical placements. They can also learn about nursing as non-live experience through written language (e.g., nursing textbooks) in classrooms.

Nursing students believe that the live experience of nursing is vital as they regard nursing studies to be practical. Moreover, they prefer their live experience to non-live experience (i.e. classroom learning) for building better nursing knowledge.

> *I can go and watch the things, which I used to learn in classrooms by books, in person [during clinical placements]. Sometimes, I can't build nursing knowledge by only using the books. If I have a chance to see the thing in person during clinical placements, I can easily build nursing knowledge with that experience and it stays in my head.* (Ari, Nursing student)
>
> *I can learn nursing with a sense of reality in clinical environments.* (Hwashin, Nursing student)
>
> *Definitely, I don't easily forget the things I learn during clinical placements. I now have more residual knowledge from the placements than from classrooms… the knowledge from clinical placements is more interesting and stays longer in my memory. I think [live] experience is very important. For example, although I might have learnt about Lasix [diuretic] through a book, I couldn't recall it. However, I can still remember about Lasix now after experiencing the medicine during clinical placements… the knowledge from [live] experience stay in my mind longer than the knowledge from books… No matter what, I think [live] experience is really important.* (Dahee, Nursing student)

The reason that nursing students have more positive attitudes towards live experiences compared to non-live experiences in classrooms, is the belief they have that live experiences stimulate their five senses.

> *It is very effective to get [nursing information] using our five senses.* (Sarang, Nursing student)
>
> *Books only stimulate my sense of vision, but live experience stimulates my five senses.* (Sori, Nursing student)
>
> *[Live] experience uses five senses. For example, I study about a urinary disease using a book and symptoms of this disease, such as red colour urine with odour, are explained in the book. After some time, I can't recall properly whether the colour is red or green. However, if I meet the patient with the urinary disease and I see the colour of the patient's urine during clinical placements, I won't forget easily.* (Yoonjin, Nursing student)

Moreover, nursing students believe that obtaining information by stimulating the five senses can allow that information to be engraved in their mind as an image, and that can be called knowledge. The students also believe they can remember this knowledge for longer and recall it faster.

> *The information from my [live] experience stays longer in my mind… Because the information is saved as a picture.* (Dahee, Nursing student)
>
> *If I study a disease's nursing care procedure using books, it can't be saved as an image in my brain. If I see it in person during my clinical placements, the nursing procedure is saved as a picture and movie in my brain as knowledge.* (Hyemin, Nursing student)

Nursing students also emphasise that they can learn nursing studies more qualitatively via live experience during clinical placements and SBL, although they both offer narrower scopes of nursing education than learning in classrooms.

> *I can learn qualitatively during clinical placements and SBL although the scopes of learning [in those environments] are narrow.* (Kuntaek, Nursing student)

Notwithstanding that the three ways of learning are classified by live or non-live experience above, the live experience in clinical and simulation environments can also be divided into direct and indirect experiences. The nursing education conducted in clinical placements and SBL have similar educational aims (i.e., training nursing

practice). However, the students are mostly allowed only passive observation of nursing practice during clinical placements, while there is active application of nursing practice during SBL, despite the reduced realism of the simulated scenarios. Thus, the students are able to have different live experiences of nursing practice between the two environments. The students distinguish the differences as indirect and direct experience.

> *[Live] experience includes both the first and the third person points of views. When doing something, the first person is getting the direct experience, while the third person gets an indirect experience. The direct experience is the person actually doing something using his/her body, whereas, the indirect experience is the person who just sees or hears others' actions.* (Hwashin, Nursing student)

Nursing students assert that they can have indirect experience during clinical placements, while they can have direct experience during SBL.

> *We get indirect experience from clinical placements.* (Wanki, Nursing student)
>
> *I have many direct experiences during the simulation course.* (Hwashin, Nursing student)
>
> *If clinical placements offer indirect experience, SBL offers direct experience for building empirical knowledge.* (Dahee, Nursing student)

Amongst these two direct and indirect experiences, nursing students believe that the knowledge via direct experience is more valuable during the knowledge building process.

> *For example, I watch the nurses checking patients' V/S on clinical placements. That is my indirect experience. However, I cannot actually check the patients' V/S myself. I just observed the practice. So I will need to personally do it and keep practicing to build my knowledge. In some ways I think the indirect experience is just one of the processes of obtaining of information.* (Hyemin, Nursing student)
>
> *One real nursing practice is better than listening to several lectures on nursing practice. It stays longer in my memory if I can have a direct experience of nursing practice.* (Hwashin, Nursing student)

In reality, simulating on my own, or in other words, personally doing [nursing practice] is different from observation. Observation means not being able to recall on Friday what I observed on Monday. It is because I did not personally do it. When I can actually do real nursing practice, my understanding is reinforced. (Yoonjin, Nursing student)

5.5.4. Reflection and existing knowledge

Reflection on prior knowledge would consciously or unconsciously occur during every process of one's learning. Learners can reflect on their personal tendencies such as their beliefs and theoretical lens on their learning. Moreover, they can reflect on prior academic experience or knowledge that they already have. In order to identify the dynamics of nursing knowledge building in the three environments where nursing students' learning takes place, this research focuses on the later reflective learning (i.e. prior academic experience or knowledge) rather than the former (i.e. personal tendency).

In the three major environments where the students are educated, the reflective process in nursing education is a nursing students' matching process of their existing knowledge between the environments. For example:

In my case, while I learn new things during clinical placements, it is also a time where I learn with my eyes what I have learnt through written forms. It feels more like reviewing [the things during the placements]. (Garam, Nursing student) (i.e., reflecting knowledge from classroom learning on clinical placements).

When I read a nursing textbook about a [patient's disease], I can recall my experience from clinical placements. If I had previous experience, I can recall what happened and what was done in that ward. If I don't have the experience, I would not be able to [build my knowledge] in that way, and I would have lesser opportunities to [reflect]. (Sori, Nursing student) (i.e., reflecting knowledge from clinical placements on classroom learning)

Previously, a scenario of an infant with high fever was given [during simulation]. We were all flustered, so we weren't able to do anything. However, when I actually go to the ward, I can recall the [simulation] experience and the solutions, such as

> *applying an ice bag, cooling down the infant. When I face a similar situation in clinical contexts, I can adjust to the situation faster. So, it is good… Because I am mainly only allowed observation in clinical environments*, *I observe the nurses' practice while recalling the simulation experience, during which I actually exercised nursing practice.* (Yoonjin, Nursing student) (i.e., reflecting knowledge from simulation on clinical placements)

The reflective learning process can also occur within each learning process of clinical placements, SBL and classroom learning. New knowledge from each stage or step can also be reflected upon during other stages and steps. For instance, knowledge from the 'investigating nursing information' stage of the learning process in clinical environments can be reflected upon during the stages of 'undertaking nursing practice' as well as 'observing nursing practice'. Moreover, knowledge from the 'sharing knowledge with other classmates' step of the learning process in SBL can be reflected upon during the step of 'undertaking nursing practice'. In classrooms, nursing students can reflect on their new knowledge from 'building knowledge' step on the step of 'evaluating nursing students' knowledge'. Therefore, this reflective learning can influence further steps or stages of learning as a constant flux.

Reflection on prior knowledge from other environments has a positive effect on knowledge building such as enabling long-term memory and motivation to build knowledge.

> *Both clinical placements and classroom learning are helpful. The combined knowledge from both environments has a synergistic effect. I can build nursing knowledge from classroom learning and this knowledge is reinforced by clinical placements.* (Garam, Nursing student)

> *If I see something that I learnt in classrooms during clinical placements, I see it in greater detail and learn about its process, so I become more interested in it. What I used to just memorise [from classroom learning], I can now connect with the experience from clinical placements, increasing my understanding of it. Therefore, what I've learnt and reviewed [in this manner] stays longer in my memory.* (Dahee, Nursing student)

As Garam indicates, the reflection reinforces prior knowledge and promotes this knowledge to a higher level of knowledge. In particular, the knowledge from memorisation (i.e., the first level of knowledge) is upgraded to the knowledge from understanding (i.e., the second level of knowledge).

> *What I used to just memorise [from classroom learning], I can now connect with the experience from clinical placements, increasing my understanding of it. Therefore, what I've learnt and reviewed [in this manner] stays longer in my memory.* (Dahee, Nursing student)
>
> *When a nurse explains about a patient's disease in the clinical environment, I can easily understand if I had learnt about the disease in classrooms or during simulation. On the other way round, when I have empirical knowledge from clinical placements, I can understand the information taught in classrooms or during simulation faster.* (Bora, Nursing student)

Thus, nursing students' prior knowledge plays a vital role in the following knowledge building. Furthermore, they are able to expand their knowledge and conduct more efficient and useful education by having prior knowledge. Particularly, when they observe nurses' practice during clinical placements with their prior knowledge from other environments, it is more helpful to understand the observed practice.

> *When I visit clinical environments after building prior knowledge, my understanding is broadened and deepened. If not, my understanding narrows. It is a matter of expandability [of knowledge]. By the way, going for clinical placements after learning in the classroom is more helpful than classroom learning after clinical placements.* (Yoonjin, Nursing student)
>
> *When I visit clinical environments, I am reminded of this quote, 'I see as much as I know'. So I try to study hard [before going for clinical placements]… It is much more beneficial to visit the environments with more prior knowledge, because my knowledge expands and becomes more plentiful. [For example] yesterday, because I had prior knowledge, I was able to get hands-on experience with chest tubes, and I was able to understand more about the nursing care for patients with a pneumothorax. I observed the nurses' practice with critical thinking.* (Dahee, Nursing student)
>
> *It is not advantageous to experience nursing practice without prior knowledge in the knowledge building process. If I have prior knowledge, newly built knowledge*

> *is reinforced. However, if I have only experience without any prior knowledge, it would be hard to build higher knowledge with only that experience.* (Hyemin, Nursing student)

In addition, it is identified that nursing students can build nursing knowledge more actively when they go for clinical placements with plentiful prior knowledge. Dahee continues:

> *When I have prior knowledge, I can be active with my learning on clinical placements. When I don't have prior knowledge, I can only observe the nurses' practice passively.* (Dahee, Nursing student)

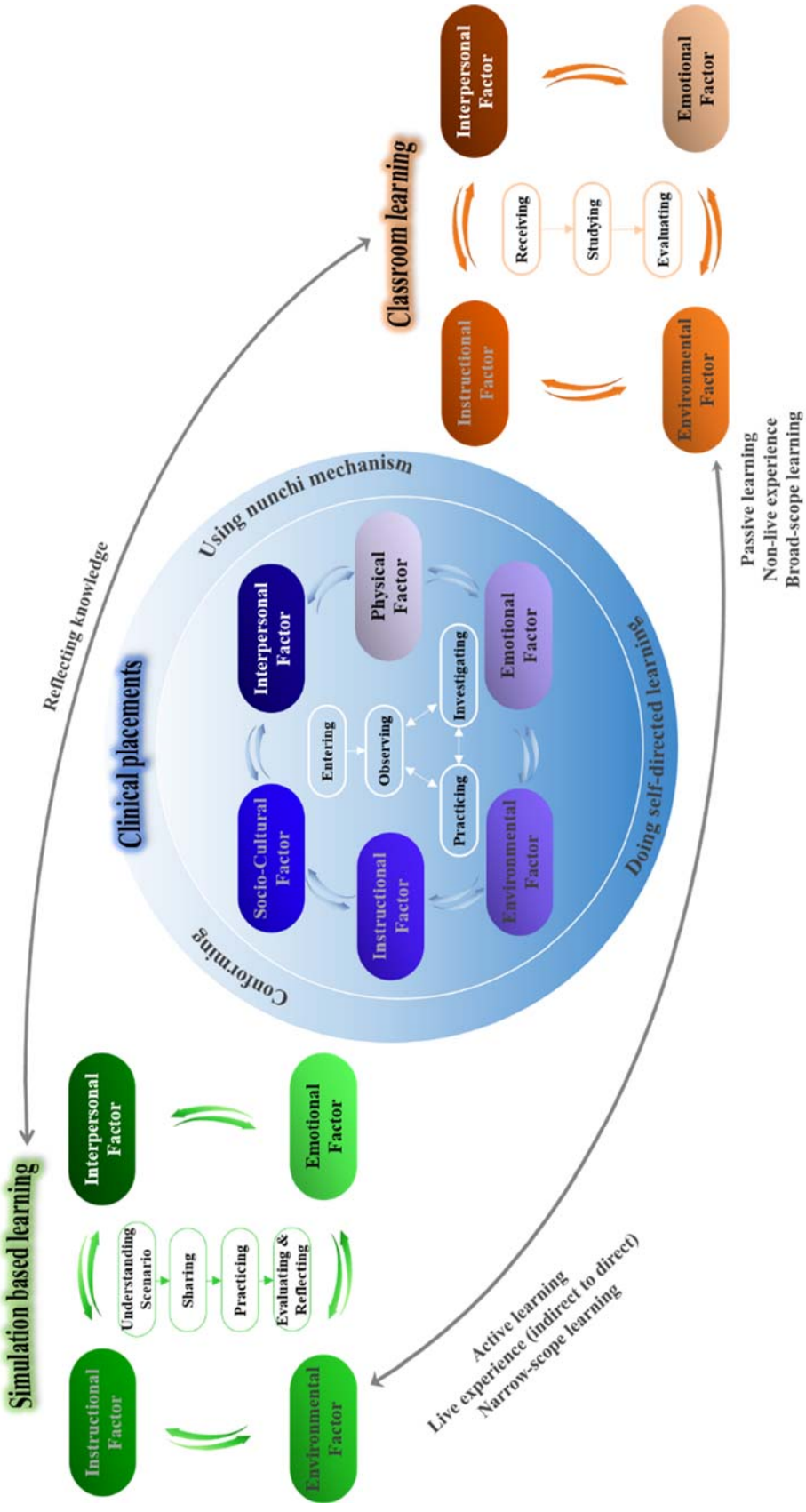
However, the mismatch of curriculums between the three environments in current nursing education frequently causes confusion and leads to difficulty of reflection on prior knowledge.

> *However, there are severe disconnections between curriculums in the three environments of nursing education. For the sake of building better knowledge, I think it is better if the curriculums were connected.* (Hyemin, Nursing student)

5.5.5. Conclusion

In this section, the relationship and comparison between the three environments have been explored and a model of the overall nursing student learning process has been generated (see Figure 10). Although these environments fundamentally have different educational methods and contexts, all the environments pursue the same educational goal, nursing knowledge building.

Figure 10. Process model: Nursing students' learning in nursing education



In these three environments, nursing students conduct their learning as being positively or negatively influenced by various influential factors. Moreover, the students conduct their education passively in classrooms and in clinical environments, or actively in simulation. The rapport with others plays a crucial role in nursing education in the three environments. In particular, the students have a difficulty to build rapport with nurses in clinical environments and this situation was explained to be due to the students' immature social competencies. Hence, nursing students' competencies of social interaction and building rapport with the main persons leading the students' education can offer better educational circumstances. Thus, nursing educators should pay attention to developing educational methods that will be able to facilitate the students' competencies for better nursing education.

In the aspect of scopes of nursing education, classroom learning offers the widest scope of nursing education, based on nursing theory. Following this, the scopes become narrower in the order of clinical placements and then SBL, which offers the hands-on learning of nursing practice. In the aspect of nursing students' educational experience, nursing students can have non-live experience of nursing education via written language in the classroom, whereas they are educated through live experiences of nursing practice during clinical placements and simulation. The students believe that nursing knowledge building through live experience (i.e., empirical knowledge) has more benefits in nursing education than non-live experience. These live experiences are divided into direct (i.e., SBL) and indirect (i.e., clinical placements) experiences.

Notwithstanding that the scopes of nursing education differs between the three environments, the education in a particular environment can be connected to that of

the other two environments via reflection on knowledge. Namely, prior knowledge from a particular environment can be reflected upon in the other two environments via the nursing students' matching process. Although quality of the reflection can be different according to each nursing student, reflection on prior knowledge is a natural cognitive learning process. In addition, the reflection plays a critical role in reinforcing the process of knowledge building and in developing a higher level of knowledge as was discussed in Chapter Four. Thus, the reflective learning can be facilitated according to how much prior knowledge each nursing student has. In addition, nursing educators and researchers have attempted to reduce the gap between theory and practice. Reflective learning is essential in nursing education, which should enable nursing students to apply nursing theory to nursing practice so as to reduce the gap, but the curriculum mismatch disturbs the students' reflection. Therefore, nursing educators are required to re-design their instruction, by matching the nursing curriculums between the three environments so as to facilitate nursing students' reflection on their prior knowledge. As each type of education in the three environments has both educational advantages and disadvantages, educators need to reinforce the strengths and improve on the weaknesses while building educational interconnections between the three curriculums. Moreover, nursing students should be encouraged to have active attitudes towards their nursing education and to have more live, direct experiences in nursing education.

CHAPTER SIX: KNOWLEDGE BUILDING DYNAMICS USING ICT IN CLINICAL ENVIRONMENTS

6.1. Introduction

Based on the nursing students' learning dynamics, which were discussed in earlier chapters (i.e., Chapters Four and Five), the influence of ICT on nursing education, particularly clinical education, will be demonstrated in this chapter. In the earlier chapters, it was identified that ICT has been directly or indirectly engaged with during the nursing students' learning processes (e.g., the use of internet and EMR and SimMan®) as a tool for nursing education.

This chapter will discuss the findings from both the quantitative and qualitative research studies investigating nursing students' use of ICT. First of all, the results of the development of the ITASH with nursing students will be demonstrated. Following this, nursing students' attitudes towards ICT in healthcare contexts from the developed ITASH and their comments regarding the ITASH will be interpreted. The students' responses to their general use of ICT from the questionnaire will also be debated. After the quantitative research, interviews with the students about their general and clinical use of ICT will be critically discussed as a qualitative research.

As this research focuses more on qualitative research, the quantitative research will play an accessorial role to support the qualitative research regarding the dynamics of nursing students using ICT during clinical placements, and is expected to further enhance understandings of the dynamic.

6.2. Nursing students' uses of ICT during clinical placements: Quantitative research method

6.2.1. Results of ITASH development

6.2.1.1. Socio-demographic characteristics

Among the exploratory factor analysis (EFA) samples of 346 students, the mean age was 23.65 years (SD = 2.70), ranging from 21 to 43 years, where 93.9% were female compared to 6.1% males, and the number of third- and fourth-year students were 43.9% and 56.1%, respectively. In comparison to EFA, the mean age of the confirmatory factor analysis (CFA) sample (n = 162) was 23.15 years (SD = 1.73), ranging from 21 to 34 years, and the gender ratio was 98.1% female and 1.9% male; furthermore, 56.6% were third-year and 43.4% were fourth-year students (see Table 17).

Table 17. Demographic data

	EFA (n=346)	CFA (n=162)
Gender		
Female	325	159
Male	21	3
Year of education		
Third	152	90
Fourth	194	72
Age	21-43 (M=23.65, SD=2.70)	21-34 (M=23.15, SD=1.73)

Note: EFA=Exploratory factor analysis, CFA= Confirmatory factor analysis

6.2.1.2. Factor Structure of the shortened version of ITASH

- Exploratory factor analysis

The participants-to-variable ratio was 7.86:1, indicating that the sample size of this

study was appropriate for factor analysis. The KMO measure was 0.75 and Bartlett's test of sphericity was significant ($\chi^2 = 3986.35$, df = 210 and $P < 0.001$). Thus, the sampling adequacy was satisfactory for factor analysis.

During three attempts of EFA, the items with factor loadings lower than 0.40 or cross-loadings on other factors with over 0.40 factor loadings were removed in the sorted pattern matrix. Furthermore, a factor with less than a 0.70 ordinal coefficient α was eliminated (Munro, 2005). As a result, a total of 18 items were omitted and a four-factor-structure with 26 items was confirmed through the statistical process of EFA. Following this process, the factors and items were reviewed by a panel. During this review process, the contents of grouped items within each factor were carefully examined for content consistency. Subsequently, five items in Factor 3 and 4 (as presented in Table 18) were removed, due to a lack of consistency with the other items in the factors. The accepted 21 items, with four factors from EFA, is shown in Table 19.

Table 18. Removed items (Lee & Clarke, 2015, p. 1187)

		Contents
F3	Q21	I can usually get help quickly when I need some advice about using ICT devices
F3	Q31	I can usually get help quickly when I have an ICT device problem
F3	Q34	The ICT training I have received has helped me to use the ICT devices efficiently
F4	Q9	The time I spend with patients is reduced because of the time I spend at the ICT devices
F4	Q14	Use of electronic health records are more of a hindrance than a help to patient care

Note: F3= Factor 3, F4 = Factor 4.

Table 19. Exploratory factor analysis (Lee & Clarke, 2015, p. 1188)

Factor	Q	Item content	F1	F2	F3	F4	
Care Value of ICT (Factor 1)	1	Using ICT devices is helping to improve patient/client care	**.95**	.13	.00	-.08	S1
	2	The sort of information I can get from the ICT devices helps me give better care to patients	**.83**	.13	.01	.03	S1
	3	Using ICT devices makes my communication with other health professionals faster	**.55**	.12	.01	.03	S1
	5	I believe ICT devices can help us deliver individualised care	**.50**	.05	.08	.05	S1
Training of ICT skills (Factor 2)	29	I feel I need more training to use the ICT devices properly	.00	**.89**	-.12	.02	S2
	27	I would like to have on-going training to help me improve my ICT skills	.04	**.77**	.00	.09	S2
	28	ICT skills are becoming more and more necessary for healthcare professionals	.13	**.73**	.09	.09	S2
	30	In order to be successful in my career I need to be able to work with ICT devices	.16	**.65**	-.01	.02	S2
	25	Using ICT devices helps to increase professionals' knowledge base	.06	**.63**	.19	-.13	S2
	22	I would like to know more about ICT devices generally	.12	**.50**	.02	.06	S2
ICT Confidence (Factor 3)	35	I lack confidence in my general ICT skills	.07	-.11	**.79**	.05	S3
	39	I generally feel confident working with ICT devices	.14	.07	**.70**	-.03	S3
	*19	I have all the general ICT skills I need for my job	-.05	-.01	**.70**	-.21	S2
	32	I am easily able to learn new ICT skills.	.05	.16	**.59**	.00	S2
	42	I'm often unsure what to do when using ICT devices	.03	-.06	**.59**	.28	S3
	*47	I sometimes feel very intimidated by the thought of using ICT devices	-.10	.09	**.54**	.28	S3
Workload value of ICT (Factor 4)	17	Using ICT devices is more trouble than it's worth	.00	.05	.00	**.77**	S1
	16	Where I work, ICT devices make staff less productive	.03	.14	.05	**.57**	S1
	15	I feel there are too many ICT devices around now	-.20	.14	.01	**.55**	S1
	10	I think we are in danger of letting ICT devices take over	.21	-.22	.03	**.53**	S1
	13	Time spent on ICT devices is out of proportion to its benefits	.10	.00	.00	**.53**	S1
		Sums of Squared Loadings	4.4	3.1	2.0	1.6	
		% of Variance	21.1	14.9	9.4	7.4	
		Cumulative %	21.1	36.0	45.4	52.9	
		Ordinal alpha	.86	.88	.83	.75	

Note: Q = Question numbers; Numbers in boldface = factor loadings higher than .40; asterisked items were omitted during the CFA process; F1-F4 = this study's pattern matrix factor loadings; S1-3= Scales 1-3 in Ward (2006)'s study of ITASH.

- Interpretation

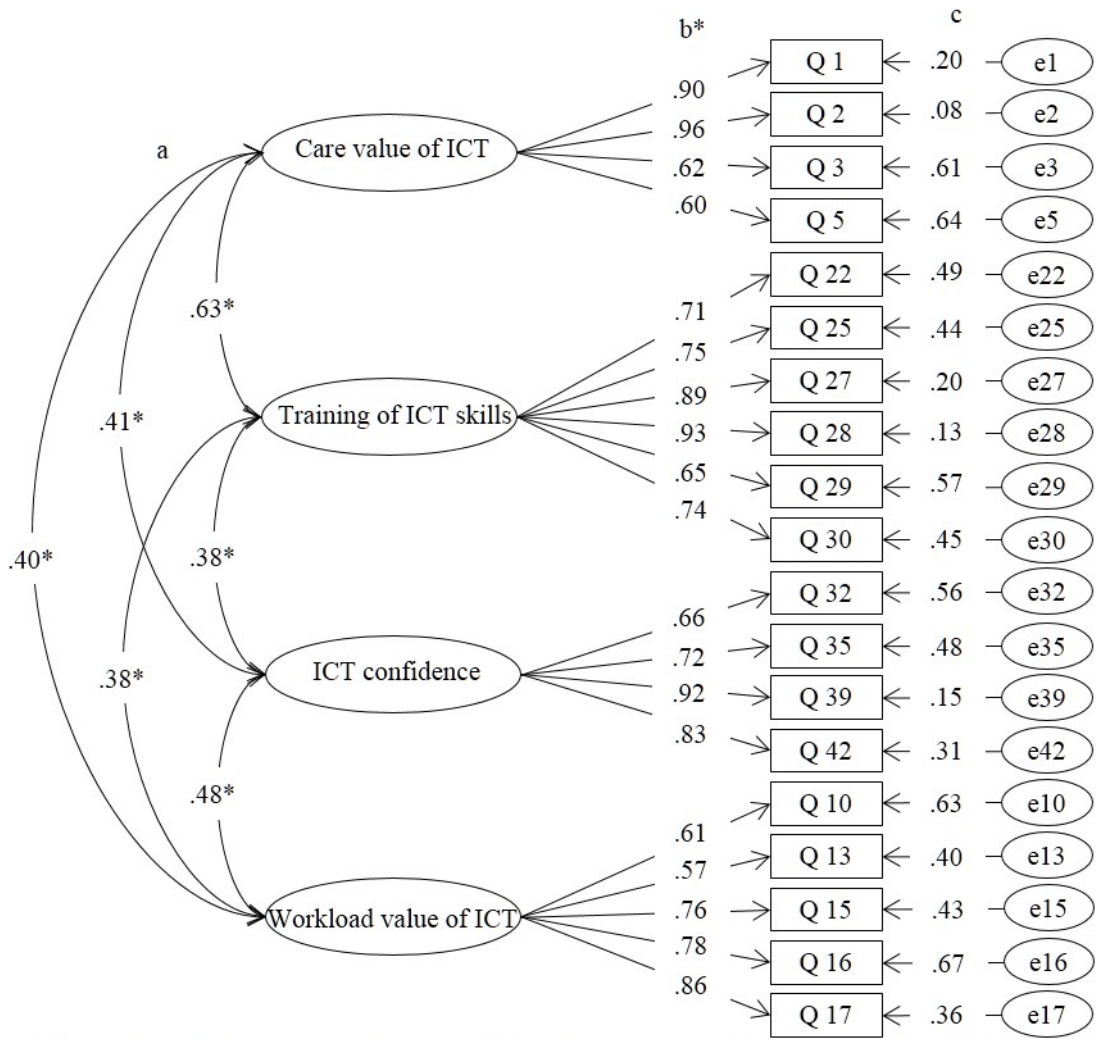
Given the four factors derived from EFA, an interpretation focusing on higher factor loading items of each factor and its comparison to the original ITASH, was performed by the panel. Factor 1 was labelled ‘care value of ICT’, as it consisted of four items dealing with the topic of care values through ICT. The second factor, consisting of six items, was called ‘training of ICT skills’, as the contents dealt with ICT training for developing relevant skills. Factor 3 was made up of six items that captured elements of confidence of ICT, therefore, the title of this factor was ‘ICT confidence’. Lastly, five items in Factor 4 included aspects with regards to ICT influences on workloads and was thus labelled ‘workload value of ICT’. The titles of each of the four factors describe the conceptual domain: ‘care value of ICT’ that is a subscale measuring how nursing students regard the contribution of ICT towards care; ‘training of ICT skills,’ which investigates the attitudes of nursing students towards their ICT training and their desire for further ICT training; ‘ICT confidence,’ a subscale assessing nursing students’ confidence in dealing with ICT; and the subscale, ‘workload value of ICT’ that examines their attitudes towards work efficiency in using ICT.

- Confirmatory factor analysis

With the defined factors and variables provided from EFA, CFA was performed (see Figure 11). Hair *et al.* (2010) asserted that CFA with unidimensionality of each factor must be confirmed as the unidimensionality determines the suitability as to whether variables are acceptable for each factor or not. Accordingly, all four factors’

unidimensionality was supported in this research and the results of the fit indices are shown in Table 20. The fit indices of Factor 1, 2 and 4 demonstrated excellent fit values. The normed chi-square values were less than 3.0 and chi-square associated p-values were higher than 0.05. Moreover, the GFI, AGFI, NFI, IFI and CFI were equal to, or higher than 0.98 and all the values of RMR and RMSEA were lower than 0.06. Factor 3, however, indicated unsatisfactory fit results in the chi-square associated p-value and in the RMSEA value, although other indices in Factor 3 were acceptable. For this reason, Factor 3 was modified by removing two items (Q19 and Q47). After the elimination of these two items, fit indices in Factor 3 were significantly improved and demonstrated excellent fit. Overall fit indices of the Korean ITASH were also tested after examining the unidimensionality of each factor. All indices with 19 items presented reasonable fits.

Figure 11. Factor structure of the Korean version of ITASH with correlations among four factors, standardised factor loadings and error terms (Lee & Clarke, 2015, p. 1189)



Note: ‘a’ = correlations among the scales; ‘b’ = standardised factor loadings; and ‘c’ = error terms; *= p< 0.01

Table 20. Fit statistics for each factor of the Korean version of ITASH (Lee & Clarke, 2015, p. 1189)

		n*	χ^2 (df)	p	χ2/df	GFI	AGFI	NFI	IFI	CFI	RMR	RMSEA
CV		4	0.33(2)	.85	.17	1.00	1.00	1.00	1.00	1.00	.01	<.01
TR		6	3.05(9)	.96	.34	1.00	1.00	1.00	1.00	1.00	.03	<.01
CF	Pre	6	23.31(9)	.01	2.59	.99	.97	.97	.98	.98	.08	.10
	Post	4	0.25(2)	.87	.13	1.00	1.00	1.00	1.00	1.00	.01	<.01
WV		5	2.85(5)	.72	.57	1.00	.99	.99	1.00	1.00	.05	<.01
Total		19	135.74(146)	.72	.93	.98	.97	.96	1.00	1.00	.08	<.01

Note: CV = care value of ICT; TR = training of ICT skills; CF = ICT confidence; WV = workload value of ICT; Pre = before removing items via CFA; Post = after removing items via CFA; n* = the number of items; χ2 = chi-square; df = degree of freedom; GFI = goodness of fit index; AGFI = adjusted Goodness of fit index; NFI = normal fit index; IFI = incremental fit index; CFI = comparative fit index; RMR = root mean square residual; RMSEA = root mean square error of approximation

6.2.1.3. Validity and reliability

Construct validity was evaluated through convergent and discriminant validity with CFA samples. The values of construct reliability (CR) and the average variance extracted (AVE) were computed for the convergent and discriminant validity, respectively. The CR value should be equal or higher than 0.70 to ensure the convergent validity and internal consistency (Hair *et al.*, 2010). Furthermore, the square of the correlation between two factors should not exceed the AVE values for discriminant validity (Hair *et al.*, 2010). As is presented in Table 21, all CR values of the factors exceeded 0.70, ranging from 0.84 to 0.91. Moreover, none of the squared correlations surpassed any AVE values in this study. Thus, convergent and discriminant validity of the four factors were supported. All four factors' ordinal coefficient values with CFA samples were also computed and ranged between 0.81 and 0.90. Therefore, the internal consistency reliability was supported.

Table 21. Squared correlations between factors, CR and AVE (Lee & Clarke, 2015, p. 1190)

	CV	TR	CF	WV
CV	1.00			
TR	.40	1.00		
CF	.17	.14	1.00	
WV	.16	.14	.23	1.00
CR	.86	.91	.87	.84
AVE	.62	.62	.62	.52
α	.85	.90	.84	.81

Note: CV = care value of ICT; TR = training of ICT skills; CF = ICT confidence; WV = workload value of ICT; CR = construct reliability; AVE = average variance extracted; α = Ordinal alpha

6.2.2. Interpretation of nursing students' attitudes towards ICT

According to the responses from the participants of EFA and CFA, nursing students evidently have positive attitudes towards the influence of ICT on care values (3.35 in EFA and 3.40 CFA) and training of ICT skills (3.22 in EFA and 3.30 CFA). Nursing students' attitudes towards their ICT confidence (2.77 in EFA and 2.83 in CFA) and the use of ICT for work tasks (i.e., nursing practice) (2.66 in EFA and 2.91 CFA) are also positive, but these attitudes are likely to be more neutral than the attitudes towards the care value of ICT and training of ICT skills, as is shown in Table 22.

Table 22. Descriptive statistics for all factors of ITASH (Lee & Clarke, 2015, p. 1190)

Factor	n	EFA (n=346)		CFA (n=162)	
		M	SD	M	SD
CV	4	3.35	.43	3.40	.41
TR	6	3.22	.39	3.30	.41
CF	4	2.77	.50	2.83	.50
WV	5	2.66	.43	2.91	.41

Note: n = the number of items; EFA = exploratory factor analysis; CFA = confirmatory factor analysis; CV = care value of ICT; TR = training of ICT skills; CF = ICT confidence; WV = workload value of ICT

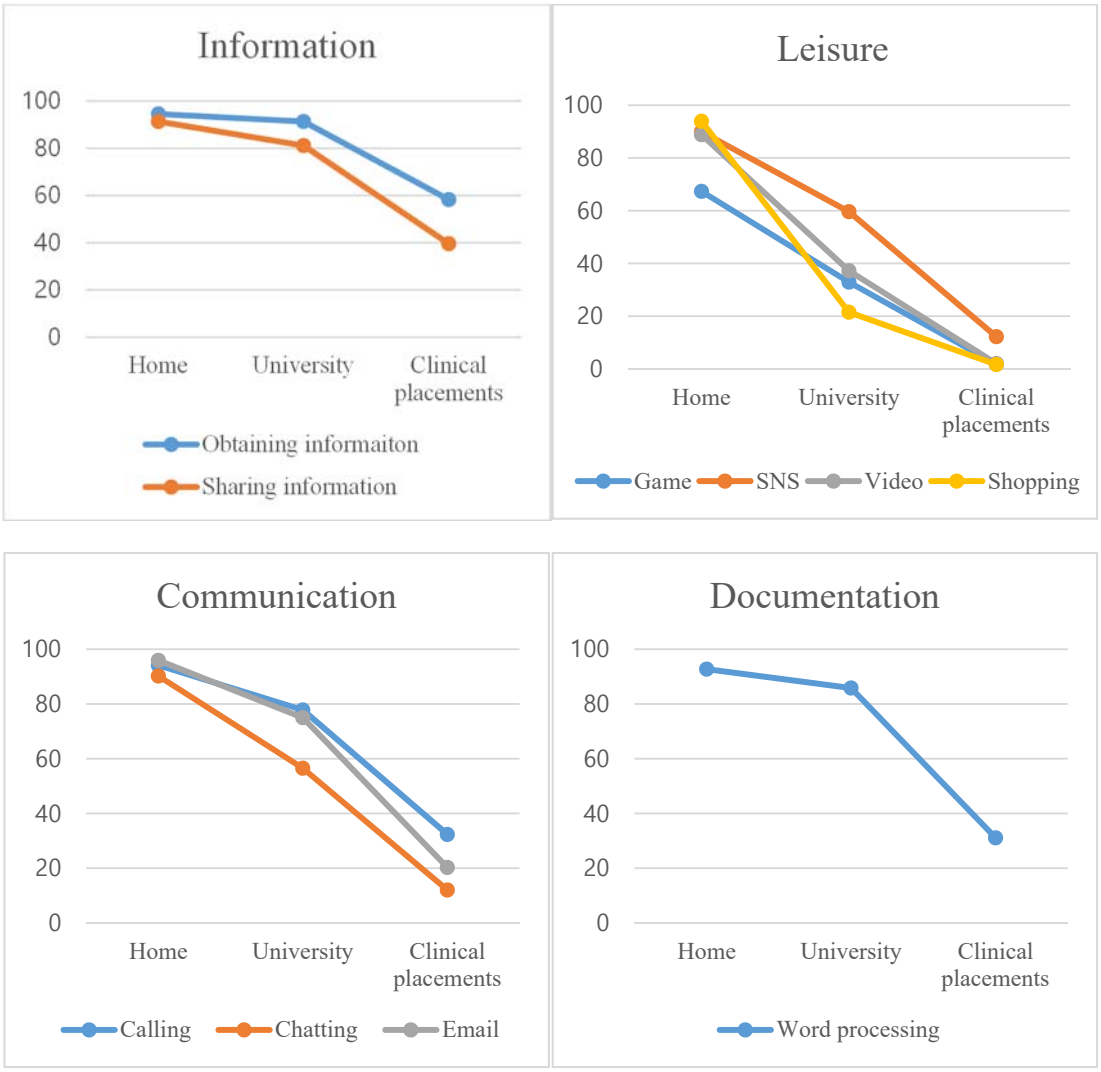
As is presented in Figure 11, all four attitude factors are in relationships of positive correlations and the correlations between the factors are significant at the 0.01 level. For example, when nursing students' confidence in ICT increase, their attitudes towards care value of ICT also increase, and vice versa. The correlation coefficient between the factors of care value of ICT and training of ICT skills is the highest, accounting for 0.63. Following this, the coefficient between the factors of ICT confidence and workload value of ICT is the second highest at 0.48. Other correlation coefficients are around 0.40.

Nursing students use ICT for diverse purposes. This research has unearthed that the coefficients of ICT utilisation by nursing students are markedly different between three environments (i.e., home, university and clinical environments) as is shown in Table 23 and Figure 12. Nursing students' coefficients of ICT utilisation are high in the home>university>clinical environments order. They show the highest coefficients of ICT utilisation at home, around 90% or higher, with the exception of using ICT for playing games. Following this, the coefficients of using ICT in university are mostly over 55%, excluding ICT for the purpose of leisure in the university. However, this research identifies that the coefficients of ICT utilisation for all purposes are dramatically reduced for clinical environments. The reason for the radical decrease will be discussed and clarified in the analysis of the comments they left on the questionnaire and the following qualitative research.

Table 23. Nursing students' coefficients of ICT utilisation in three environments via selected purposes

			Home	University	Clinical Environments
Processing information	Obtaining information	n	480	464	296
		%	94.5	91.3	58.3
	Sharing information	n	464	412	201
		%	91.3	81.1	39.6
Leisure	Game	n	342	167	9
		%	67.3	32.9	1.8
	SNS	n	456	303	62
		%	89.9	59.6	12.2
	Video	n	451	189	10
		%	88.8	37.2	2
	Shopping	n	477	109	8
		%	93.9	21.5	1.6
Communication	Calling	n	478	395	164
		%	94.1	77.8	32.3
	Chatting	n	458	287	61
		%	90.2	56.5	12
	Email	n	487	381	103
		%	95.9	75	20.3
Documentation	Word processing	n	471	436	158
		%	92.7	85.8	31.1

Figure 12. Nursing students' coefficients of ICT utilisation in three environments via selected purposes



In an open-ended question 'please put any further comments about your usages of ICT in clinical contexts in the following box' included in the ITASH questionnaire, nursing students were given the opportunity to express their opinions about their use of ICT. 55 participants left their answers in the questionnaire and these answers are classified into five categories: 1) nursing students' limited use of ICT (n=16), 2) lack of nursing students' ICT education (n=10), 3) different ICT systems between hospitals (n=5), 4) wanting more advanced ICT devices in hospitals (n=12) and 5)

disadvantages of ICT (n=12). The students' example comments are shown below (see Table 24).

Table 24. Nursing students' example comments regarding the uses of ICT in clinical environments

Category	ID	Comment
Nursing students' limited use of ICT	28	*ICT in hospitals is essential for utilising [medical] information, but due to our positions as students, I have to study the nurses' nunchi to use the ICT*
	162	*As students on clinical placements, we have some restrictions in using ICT devices*
	488	*During clinical placements, there is absolutely no conducive environment set up for students to use ICT devices*
Lack of nursing students' ICT education	211	*During clinical placements, nursing students do not specifically get any ICT training*
	281	*There is no specific education for nursing students to use ICT devices*
	429	*Nursing students don't receive any ICT education. Most students familiarise themselves with ICT by trying it out on their own*
Different ICT systems between hospitals	17	*The ICT used is different between hospitals and in some cases, the devices are run-down and inefficient*
	200	*Through my clinical placement experience, I could feel that the ICT propagation rates were diverse between hospitals*
	226	*Depending on the clinical placement site, the ICT environment can be vastly different [from one site to another]*
Wanting more advanced ICT devices in hospitals	125	*With regards to [saving] space and time, I think the use of tablet PCs would be helpful in increasing work efficiency*
	332	*It would be better if nurses utilise a mobile application rather than printed handouts when they need to explain about discharge medications*
	468	*The ICT devices currently in use are somewhat worn-down, so I think there is a need to be an upgrade of the speed [of the ICT devices]*
Disadvantages of ICT use in clinical environments	391	*Due to the large volume of documentation that nurses mandatorily have to complete [through ICT devices], their hands-on nursing care with the patients is disturbed*
	467	*Due to the nurses' excessive documentation duties [using ICT], nurses have insufficient time to carry out hands-on nursing care with patients.*
	473	*Nurses have fallen into a dilemma as they can forget about their duties of caring for the patient due to excessive workloads related to [using] ICT*

The nursing students' comments in the first category indicate their limitations in using ICT in clinical environments due to their social positions as students. Moreover, the second category shows that they are struggling with a lack of ICT education during clinical placements. The students also point out that there are different ICT environments between hospitals in the third category. In the fourth category, they believe that newer and more advanced ICT would enhance the efficiency of nursing works. Interestingly, in the fifth category, nursing students assert that ICT has brought on an increase to nurses' workloads and they believe that this reduces nurses' interactions with patients.

Last but not least, the question 'Do you think ICT devices are useful for your nursing knowledge building during placement?' was also asked in the questionnaire and 494 (97.4%) participants ticked 'Yes'. Moreover, 358 of the 494 participants left comments about why they chose 'Yes'. Those comments are categorised into two groups: 1) usefulness of medical information collection (n=345), and 2) the needs of the current era to use ICT (n= 13). The majority (i.e., 345 of 358 nursing students) asserts that ICT is a useful and effective tool to collect information for their knowledge building. On the other hand, the minority (i.e., 13 of 358 nursing students) believe that they are required to be up-to-date with the development of ICT in their society. The examples of their comments are shown below (see Table 25).

Table 25. Example comments: Usefulness of ICT for knowledge building

Category	ID	Comment
Usefulness of medical information collection	94	*ICT helps increase work efficiency. It simplifies documentation and record inquiry*
	115	*I can get hold of patients' most recent information via ICT, including all medical conditions, past medical history and diagnostic lab results. Moreover, with ICT, I can immediately search for relevant information and literature*
	170	*It is convenient and enables me to process information faster. Moreover, it can be used for communicating with other healthcare staff*
	244	*It is very beneficial in obtaining patients' information. Although I am restricted from using my smartphone, tablet PC and the internet during clinical placements, I can obtain patients' information via EMR*
	414	*Efficient, time-saving, speediness in utilising information!*
	489	*I can obtain information faster and that information is beneficial in providing nursing care to patients*
Needs of the current era	173	*It is an information-oriented society. We can offer a high quality of nursing care through the use of ICT*
	216	*Nowadays, ICT is used generally wherever you go, so by using ICT, we can get more up-to-date information*
	501	*As society is changing and expanding, there is a need for ICT*

6.3. Nursing students' uses of ICT during clinical placements: Qualitative research method

In this section of qualitative research, 1) nursing students' general uses of ICT, 2) nursing students' viewpoints of clinical uses of ICT, and 3) nursing students' learning with ICT during clinical placements will be explored, based on the nursing students' experience.

6.3.1. Nursing students' general uses of ICT

It is the age of ICT. Nursing students recognise that ICT has rapidly changed the

structure of their society as well as their daily life due to the rapid development of ICT.

> *The internet was introduced [into society] when I was a primary schoolchild. The internet started propagating rapidly while I was in secondary school and I made use of it a lot. It was only back in primary school, whenever there is something I didn't know I would look it up in encyclopaedias. Now, because of the internet, I hear that many book publishers have become bankrupt.* (Dahee, Nursing student)

> *Whether it is the clinical environment or people's daily life, there have been many changes. Even now, sometimes while using my smartphone, I think to myself, "How is it that we have something like this?" This is because many things that were impossible and unthinkable in the past have now come into being, even in our daily life, due to the development of ICT.* (Ari, Nursing student)

Having lived within these contexts, the nursing students believe that they have been exposed to ICT throughout their lives and they generally do not have difficulties with the use of ICT.

> *As we are part of the generation to have used ICT, including computers, since we were little, I think we would be able to use ICT in whatever situation we are thrown into [compared to the older generation]. Even if it is a new ICT device, we can adapt to it easily because I think in our generation, we can figure things out by ourselves. If I buy a new, cutting-edge smartphone, I can figure out all its functions and how to use it after playing with it a few times.* (Yoonjin, Nursing student)

Like Yoonjin, nursing students believe that they are generally competent enough (c.f., not outstanding) to use ICT and are satisfied with their ICT competency.

> *Although every now and then I have difficulties using ICT, it is never a big problem for me. I think I have sufficient confidence and ability to use ICT. I can operate general [ICT] devices and programmes by myself.* (Wanki, Nursing student)

> *Having grown up within this generation [that has been exposed to ICT since young], I believe I have sufficient abilities [to use ICT].* (Kuntaek, Nursing student)

According to the definition of ICT specified in Chapter Two, nursing students mostly use ICT with the purpose of obtaining and sharing information (i.e., having processed the information) for their learning in nursing studies and/or general information

acquisition such as news articles.

> *Searching for information. [I search information by ICT,] when I need information for my daily life and for knowledge building in specific areas.* (Hyemin, Nursing student)
>
> *I generally use ICT to search for information.* (Yoonjin, Nursing student)
>
> *I also share information on the internet. I mostly use the internet for this purpose.* (Dahee, Nursing student)

This finding correlates with the finding from the quantitative research. The nursing students' coefficients of ICT utilisation showed a higher rate of utilisation for obtaining and sharing information (see Table 23). Moreover, as was also presented in the coefficients, nursing students use ICT for different purposes such as leisure, communication, and documentation.

> *While I use the internet for doing my homework, I mostly use the internet [through ICT devices] with the purpose of leisure such as internet shopping, watching videos and reading webcomics.* (Dahee, Nursing student)
>
> *I often use ICT with the purpose of leisure.* (Garam, Nursing student)

Nursing students prefer to use ICT, as they believe its use has diverse benefits, particularly in processing information. The benefits of using ICT are identified as follows:

1) Speediness

Firstly, nursing students emphasise that there is an advantage to obtaining desired information quickly via ICT.

> *I can obtain information quickly through ICT.* (Ari, Nursing student)
>
> *ICT promptly provides me with the information every time I require it, which is something I find necessary. Not only is it uncomfortable to carry books around,*

> *there are places with restrictions on bringing in books. On the other hand, with just this smartphone, I am able to search [for information] straightaway. As there are times when I am feeling impatient and want to know something straightaway, [it doesn't feel good] if I have to find out about it later… [With ICT] I feel like, "I want to know now and I can look it up now".* (Kuntaek, Nursing student)
>
> *The ultimate objective of using ICT is to be able to do everything faster.* (Yoonjin, Nursing student)

In Chapter Five, the Korean culture of 'ppalli-ppalli' was discussed and it was identified that the Korean society puts a high value on the ppalli-ppalli (i.e., speediness) (see *5.2.2.2.1. Ppalli-ppalli culture in Korea*). Furthermore, it was also discussed that nursing students put great value on the rapid acquisition of information using ICT. Thus, recalling the points as discussed in Chapter Five would be useful in understanding the nursing students' preference for using ICT.

2) Efficiency

The students also focus on the efficiency of ICT. They believe that they can save time on obtaining information as they are able to search for the information quickly via ICT.

> *I can definitely save time using ICT, especially for completing my assignments.* (Yoonjin, Nursing student)
>
> *I can get information straightaway. ICT is very useful because it saves time.* (Dahee, Nursing student)

3) Convenience

When nursing students search for information, they can conveniently obtain the information through ICT.

> *I think ICT has made everything more convenient. If there is something we don't know, we can find out about it by conducting a search [via ICT].* (Dahee, Nursing student)

I think I gain time, as [using] ICT is fast and convenient. Without needing to do a paper search, I am able to view all the information, all at once. (Sua, Nursing student)

It is much easier to search for information using ICT… When I looked up English vocabulary in the past, I had to use a [paper] dictionary. But nowadays, I just need to type out the words [on the web] and I can easily find their meanings. (Yoonjin, Nursing student)

4) A large volume of information

Based on the above advantages, they are able to quickly, efficiently and conveniently connect with a large amount of information via ICT more than ever before. This means ICT is a tool that facilitates people connecting to a large amount of information.

In the past, I would search through books for every piece of information I wanted, but [now] if I simply type in what I am searching for [on the internet], everything comes up straightaway. That's why I think I am able to acquire a large volume of knowledge. (Garam, Nursing student)

When doing my assignments, I can get much more information via ICT within a very short period of time, rather than searching for the information in books in a library. (Sori, Nursing student)

Whereas, nursing students also express their opinions regarding the disadvantages of using ICT. As was discussed in Chapter Five, they believe their personality has become more impatient due to ICT use (see *5.2.2.2.1. Ppalli-ppalli culture in South Korea*).

I feel like I have to keep up with ICT advancements in order to do even better… It is probably because of this that I feel like I have become a little more impatient. (Hyemin, Nursing student)

My personality has become more impatient. As I constantly seek speediness and accuracy, which are the advantages of ICT, I think that's why I have become so… I don't think [the change] is a good thing. There are times where I have to be a little more laid-back, but it is hard to control myself! (Wanki, Nursing student)

The drawback [of using ICT] is that people have become impatient? As ICT develops, people are becoming more impatient. (Kuntaek, Nursing student)

In addition, they also believe that people are now inclined to get obsessed with ICT (particularly the internet) due to its benefits such as convenience and usefulness.

> *Everything I do is different now. In the past, if I wanted to meet up with a friend, I would call [to arrange it]. Now, I use my smartphone [to text]. When I do my assignments, I would have to write notes but now I use my laptop and smartphone. When I want to go shopping, I should be going out, but now, again, I use my smartphone [to shop]. For all that I need to do in a day, there's nothing like this smartphone [to help me]. On second thought, it is like an addiction [to ICT]. Is it a bad addiction?* (Bora, Nursing student)

> *As I got used to using ICT, I think I have gotten addicted to it. If I am in a situation where I can't use ICT, I feel anxious and get annoyed... This is because ICT is something that I usually keep with me at all times, wherever I go.* (Wanki, Nursing student)

> *I was looking through some past photos, when my friends and I gathered together and were chatting away… However, now, we would just sit without talking and just look at our smartphones. If you look at us now, even if we were in the same place, we would just be looking at our smartphones, texting… Like, we can't not use our smartphones. I think there's the sense of uneasiness. If we do not have our smartphones, I think it would be very uncomfortable.* (Sori, Nursing student)

A nurse, Hansol, also points out her disposition due to the use of ICT.

> *Of course I use ICT very often. I use ICT more than once every hour. I think I may be investing an excessive amount of time in ICT. But even acknowledging that, I can't detach myself from ICT. If I do so, for some reason it feels empty. Uneasy… How shall I put it? Obviously I don't need to look at my smartphone, but I end up checking it constantly, or if I am unable to contact [others] I will feel uneasy. I've definitely become impatient.* (Hansol, Nurse)

However, the students believe that the merits brought on by ICT surpass the disadvantages mentioned above.

> *The advantages of ICT far outweigh its disadvantages.* (Sori, Nursing student)

6.3.2. Clinical uses of ICT in nursing students' viewpoints

As demonstrated in Chapter Two, the development of ICT has transformed clinical environments. Nursing students also agree about the rapid transformation as they have experienced those environments during clinical placements.

> *There are many changes [because of the development of ICT]. When I compare the current clinical environments with that of the one I visited before becoming a nursing student, it is very different. Even the environments where I had clinical placements during third year are so different from the environments I am experiencing now [as a fourth year student].* (Ari, Nursing student)

> *I went for my first clinical placement during my second year, which lasted only one day. Back then, the nurses would carry out their practice, write down what they have done, then come back to enter the information [into the system]. Not even a year later, in big hospitals, the nurses go around carrying a laptop, and almost everything is computerized…* (Dahee, Nursing student)

> *When I was in the first semester of my third year, I went for a clinical placement at a hospital. At that time, V/S recording was written manually. I thought the same was done everywhere, but when I went for clinical placements in the second semester, the old system was replaced by EMR. Similar changes continued over time and when we go to big hospitals, the nurses would tell us about how things are done there, as if they were boasting, which made me think that ICT is heavily utilized [in the hospitals].* (Yoonjin, Nursing student)

Notwithstanding the rapid transformations of clinical environments, nursing students believe that the environments need to advance even more than now. The students assert that the clinical environments are still in a transition period, and are simply following the ICT advancement trends of non-clinical spheres.

> *I think that [the ICT in hospitals] gets left behind in the speed of development of our technology era. ICT [in hospitals] does not lead the development, but just barely follows it. If we were to say that clinical environments are following the [speed of technology development], then everyone should have their own tablet PC. In reality, even in advanced hospitals, only one laptop is supplied to each team. There are many hospitals that don't have it at all. Each staff should be supplied with one of such ICT [tablet PC or smartphone] before we can say that [clinical environments] are following the [speed of technology development].* (Bora, Nursing student)

Clinical environments have not fully taken on [ICT developments]. Things are changing gradually. Some hospitals have created hospital guide applications [for visitors]. Some hospitals are following the trend but I think it is [still] in a transitory period. (Sori, Nursing student)

As the nursing students argue above, it would be deduced that they have no aversion to ICT development, and that they desire for clinical environments to develop more.

I hope that not only the currently utilised ICT in hospitals becomes more advanced, but also all ICT [that can be used in clinical environments]. It is handy and efficient. (Ari, Nursing student)

There isn't a lack of ICT devices in hospital, but I think it would be more efficient if there were more advanced ICT devices. It would be good if there is a lot [of ICT devices]… (Wanki, Nursing student)

I feel that ICT in clinical environments is lacking. I hope there will be an increase in efficient and useful ICT devices [adopted for use]. (Bora, Nursing student)

This was also identified in the quantitative research. In the quantitative research, it was found that the students wanted hospitals to adopt more advanced ICT devices (see Table 24: Wanting more advanced ICT devices in hospitals).

The dependence on ICT for nursing duties has also increased in many clinical nursing fields due to the influence of rapid ICT development in clinical environments.

I can utilise ICT to measure [patients'] blood pressure, temperature, blood sugar, check blood lab tests, allergies, and also do charting. I think [I use ICT] for about 70% [of my work]. The remaining work is nursing care with the patients, explaining things to them. (Hansol, Nurse)

The clinical environments have been changed a lot [due to ICT]. In the past, there were no laptops in the nursing carts (nursing trolleys in the UK), so we couldn't enter our nursing notes, get necessary information, and use the internet while moving around. We would just sit at the nursing station to use the computer. However, now it is all portable so I can do while moving around. Devices like the blood sugar meter are different too. (Sukjin, Nurse)

Computers are utilised for about 70% of the nurses' work. For every task, even if it is a mere trifle, they use ICT. For example, when preparing to administer

patients' medicine, they use ICT. When checking patients' V/S, they use ICT. When recording their nursing practice, they use ICT. Overall, the use of ICT forms a big part of nursing practice. (Sori, Nursing student)

Nurses and nursing students emphasise that the ICT most frequently utilised by the nurses is computers (e.g., laptops and desktops as hardware), on which they utilise the EMR (i.e., software). It means that the nurses mostly use the hardware and software that comprehensively allows them to save, read, and share clinical information.

I think the EMR is the most important ICT and I use it a lot. If there is no EMR in the clinical setting, I will not be able to share [medical] information with others. I can check whether blood pressure readings are in normal ranges through other means, but without the EMR, it is hard to share that information. (Hansol, Nurse)

The ICT that nurses use, the computer, allows them to write nursing records, check notifications, prescription orders, and lab results, and so forth. (Sori, Nursing student)

The ICT most used by nurses is obviously computers, because of the task of recording nursing practice. (Kuntaek, Nursing student)

Both nurses and nursing students verified the advantages and disadvantages of using ICT in clinical nursing fields. The advantages and disadvantages of ICT in general use discussed earlier are also reflected here.

The advantages of ICT in clinical use are:

1) Convenience and assistance of nursing work

The advantage of ICT use in clinical environments is convenience. (Hansol, Nurse)

As I carry around a laptop in my nursing cart, my work has become easier and physically, it is slightly easier on me as well. For example, when checking a patient's intake and output, I just pull my nursing cart to the wardroom, check the intake and output and upload it using the laptop. When administering injections, I can check the patient's [details] and administer straightaway. This way, errors can be greatly reduced. Because of all these reasons I think [ICT] is good. (Sukjin, Nurse)

When nurses use the EMR, they can easily check a patient's progress and easily find the information they want. If they wish to check things like diagnoses, investigations and readings, they can do so with just a click of the mouse. (Hwashin, Nursing student)

2) Nursing work efficiency via time saving

I can assess and provide nursing care to patients faster if I use ICT. (Hansol, Nurse)

Saving time! Because of this, nurses' work hours are reduced and work efficiency increases. Based on my observations, nurses can complete something that needs to be done twice in one shot [when utilising ICT], making it easier and faster to complete their nursing tasks. (Dahee, Nursing student)

3) Nursing quality improvement

We can offer dedicated nursing care to patients… We can reduce medical errors such as medication errors, and especially blood transfusion errors. We used to use verbal confirmations, but because we now use the barcode system, the rate of errors can be close to zero percent. (Hansol, Nurse)

Due to the development of ICT, I think the quality of nursing care for patients has definitely improved. (Hyemin, Nursing student)

Nurses can write more accurate nursing care records with the EMR. Even if the time taken for using the EMR is the same as writing the records by hand, the quality of the nursing care records should be higher [when using the EMR]. Both recording methods take up time, but the quality will be improved [by using EMR]. (Bora, Nursing student)

Meanwhile, nurses and nursing students note that ICT use in clinical environments has also brought disadvantages to nursing professionals. First of all, they criticise the excessive dependence on ICT that nurses have when undertaking nursing practice.

I think the disadvantage is… our dependence on ICT devices. (Sukjin, Nurse)

As we rely on the ICT, we become mechanical and business-like. (Hansol, Nurse)

The disadvantage [of ICT in clinical use] is the tendency to depend on the use of ICT… As it feels uncomfortable without, it means there is a dependency on [ICT]. (Wanki, Nursing student)

In the same vein, the students believe that nurses spend many hours using ICT due to their high level of dependence on it, and therefore it causes a reduction in nurses' direct contact with the patients.

> *Nurses should have direct contact with patients to perform nursing practice. I understand the advantages of ICT development, for example, nurses can detect changes in the patients' conditions quickly with remote patient monitors at the nursing station. However, I think it is not the same as nurses checking the patients' conditions themselves. If the nurses only look at the computer screen, they won't know what the patients need. So, ICT can be good for integration [of nursing work] but it can also be a hindrance to the quality of care.* (Sarang, Nursing student)

> *Nursing care is a job that requires a human touch, and ICT only plays the role of making the job easier. In other words, the main role of ICT is a supportive one. The nursing that comes to my mind can only be performed by humans, not ICT.* (Dahee, Nursing student)

Ironically, nurses and nursing students stress that the merits of ICT have failed to increase the nurses' direct nursing care, even though nursing work has become easier and more efficient due to ICT.

> *Although I can say that I save time by using ICT, I can't say that the time to do something else for the patients has increased. I don't know why… My thinking is that increasing the time spent on bedside care for the patients is [providing] effective care. The time available to see patients should be increased so that I can explain [our care plan] more to the patients, and do more assessments. I should be providing comforting touch by stroking the patient's back, and continual patient education for things like lung care. These are tasks I would call nursing care, but there needs to be more time to do all of it…* (Hansol, Nurse)

> *I don't think time for bedside care has increased, rather I feel the time spent in front of computers has increased.* (Sunja, Nurse)

> *Between the hospital that heavily utilises the EMR and the hospital that doesn't, the hospital using EMR can save time more than the latter… but I don't think there is a huge difference in direct nursing care [with the patients] between the two.* (Eunju, Nursing student)

In the nursing students' comments of quantitative research, no improvements in direct nursing care when nurses use ICT can be found (see Table 24: Disadvantages of ICT

use in clinical environments). They believe that one of the reasons that the time for direct nursing care has not increased is because of the increased workload by ICT.

> *I think [nurses'] workload has increased. When they have to do something quickly, and because they can see the [prescription] orders straightaway, they get busier [due to the increased speed]. Because work can be done quicker [with ICT], nurses end up having to do other jobs. It means that before, in the time they did one thing, they now have to do two, so they are just as busy before and now. The more information they obtain [in the same amount of time], the more work they have to do.* (Dahee, Nursing student)

> *Others would think that nurses could tend more to patients in the time saved from writing nursing records due to the development of technology, but as I have mentioned earlier, despite the reduced time taken to write each nursing record, it seems like there's more to record about. The faster the work process has become, the more work that nurses are given to complete.* (Hyemin, Nursing student)

> *As [ICT] has become more advanced, more time is saved but that time is not left to become spare time. Advancements in ICT cause an increase in the nurses' workloads.* (Miran, Nursing student)

Nurses also agree with above students' arguments.

> *I do believe nursing has developed with the use of ICT, but our workloads have increased. In the past, what we were unable to see, we now can and must see. We need to pay more attention to things like patient safety.* (Hansol, Nurse)

> *As ICT developed, so has the increase in other work.* (Sukjin, Nurse)

Lastly, nursing students raise concerns of security and leakage of confidential information as another disadvantage of using ICT in the clinical setting.

> *I heard from a nurse that nowadays, at the hospital, [nurses] are very cautious and pay great attention when using ICT to avoid the leakage of patients' confidential information.* (Garam, Nursing student)

> *Patient information should be handled very sensitively, but because it has become easier to access information through ICT, cases of confidential information leaks occur.* (Yoonjin, Nursing student)

As discussed above, nursing students have ambivalence towards the use of ICT in

clinical environments. However, Yoonjin, a nursing student, emphasise that "*the use of ICT in clinical environments is essential and an inevitable trend of this era*". Moreover, as Sori, another nursing student, asserted earlier in *6.3.1. Nursing students' general uses of ICT*, nursing students believe that they can find more advantages than disadvantages of using ICT.

6.3.3. Nursing students' learning with ICT during clinical placements

In this section, nursing students' uses of ICT during their clinical placements for nursing knowledge building will be discussed. The six influential factors on nursing students' learning in clinical environments were demonstrated in the *5.2.2. Influential factors on learning in clinical contexts*, indicating that nursing students' uses of ICT are also affected by those influential factors. A demonstration of the nursing students' uses of ICT with the influential factors in clinical contexts would offer rich understandings of their learning with ICT during clinical placements. However, it is to be noted that the physical factors don't influence the students' uses of ICT. Therefore, their uses of ICT during clinical placements will be discussed with the other five factors (i.e., interpersonal, socio-cultural, instructional, environmental and emotional factors).

Before exploring these factors, it would be worthwhile to understand what type of ICT nursing students mostly use during clinical placements. It was demonstrated earlier that the ICT nurses mostly use in clinical environments was the EMR system accessed via computers. Likewise, nursing students mostly access the same EMR system using computers during clinical placements.

> *I access the EMR the most by using computers during clinical placements. Approximately 80% of my ICT usage would be the EMR and computers.* (Sori, Nursing student)
>
> *I utilise computers to access the EMR when in clinical environments. If not for that [purpose], I don't think [I use] anything else.* (Wanki, Nursing student)
>
> *EMR is the most often used ICT. As for me, other than the use of the EMR, there is [no other ICT] that I use. [Moreover,] I can't use ICT with the exception of the EMR.* (Dahee, Nursing student)

The major purpose for nursing students to use the EMR is to obtain clinical information during clinical placements as the EMR offer a large amount of clinical information.

> *As I am a student, I am in a certain ward only temporarily, so there is a limit to the things I see within that short period of time. However, I believe that I can gain knowledge through the information I get from the EMR. The EMR includes all the treatment, nursing practice, medication and so on that the patient received from the time of hospitalisation until discharge. So, when I look at these records altogether, I can understand what nursing practice is done for specific situations. It supplements the things that I can't observe and experience during the placements.* (Hyemin, Nursing student)
>
> *Even though we can ask the patients ourselves [to gain information], we can get more patient information and their lab results, as well as look up medication information by using the EMR. So, it is very useful for our nursing education.* (Ari, Nursing student)
>
> *We can study, do our case report, and gain patient information and history easily using the computers [on which the EMR is installed] in hospitals… As a nursing student, I can get everything I need, which means patient information, through the EMR.* (Bora, Nursing student)

Along with observing nurses' practice, nursing students spend many hours investigating nursing information, as was discussed in the section of *5.2.1.4. Investigating nursing information*. Nursing students come into contact with a large volume of clinical information that they need through the EMR, and then build their own nursing knowledge. The connection with clinical information is one of the crucial steps in the knowledge building process, as was demonstrated in Chapter Four.

The EMR is useful in building my nursing knowledge. This is because I can match up the symptoms of the diseases I have learnt about in theory to real life. By looking at the charts in real life, I can learn more about the disease symptoms… I use the EMR to understand a bit more about the patients, and am able to look up the things I am curious about. I don't use the EMR just for my case report. (Yoonjin, Nursing student)

I can find a lot of useful information by EMR, if I use the EMR properly. If I just click on one button, I can get all the information on a specific drug. There are so many benefits from using the EMR… As the information that I can't get from the patients is already stored and organised in the EMR, I can save time in obtaining information, and it is useful for my knowledge building. (Eunju, Nursing student)

The finding of the nursing students using mostly the EMR via computers would promote understanding of the following influential factors on their uses of ICT during clinical placements.

6.3.3.1. Being influenced by interpersonal factors (Factor 1: Interpersonal factors)

Nurses' deep engagement with nursing students' learning in clinical environments was discussed earlier in Chapter Five (see *5.2.2.1. Interpersonal factors*), as each student was paired with a nurse during placements. Therefore, as would be expected, the nurses are the most influential people on nursing students' usage of ICT. Nursing students are required to get the nurses' permission to use the computers and access the EMR.

Nurses influence my usage of ICT. Should I say that we have to get permission from the nurses to use? When I want to use it, I have to ask. (Wanki, Nursing student)

The nurses. When I want to use the EMR for the first time, I have to ask the nurses… As they are the people who permit us the use of the EMR, I would think nurses are the influential persons on my ICT usage. (Sarang, Nursing student)

> *If nurses teach us how to use the EMR on the first day of clinical placements, I can use the EMR a little bit, but I can't use it properly. From next day, I can use the EMR when a computer is vacant and logged into the EMR. If not, I have to ask the nurses to log into the EMR to use it, particularly when it gets closer to my case presentation.* (Yoonjin, Nursing student)

This context of getting the nurses' permission would cause an issue of nursing students becoming passive in the use of ICT as well as in their learning. Along with getting the nurses' permission to use ICT, nursing students' uses of ICT during clinical placements are influenced by the nurses' ICT education in clinical environments. This is because the nurses are the major educators in teaching all practice, including education of ICT use, during placements.

> *If the nurses don't teach me, we don't know how to use the ICT [within the clinical setting]*. (Ari, Nursing student)
>
> *If I get permission from the nurses, I am allowed to use ICT. However, if they don't teach me how to use it, I can't utilise it because I don't know how to.* (Wanki, Nursing student)

Consequently, it can be interpreted that nurses, as a main ICT educator, play a critical role in the nursing students' uses of ICT during their placements.

6.3.3.2. Being influenced by socio-cultural factors (Factor 2: Socio-cultural factors)

In the nursing education dynamics in clinical environments in Chapter Five, it was identified that the socio-cultural factors have a great influence on nursing students' learning during clinical placements. Therefore the influence of the socio-cultural factors, especially social hierarchy and discipline, also has a strong influence on nursing students' ICT usage.

> *For example, when nursing students check patients' V/S, we are only allowed to use manual tools. Nurses said that as students, we should use the manual tools. Once, my friend used electronic tools to take V/S. A nurse said, "As a student, why are you using [the electronic tools]?" and then gave him the manual one.* (Sarang, Nursing student)

> *Because of the regulations towards nursing students, I can't use ICT much in hospitals. I can use the EMR but other than that, ICT does not have a big impact on me. I want to use it, but I can't, because I am a student. I may be able to use the computers in hospital but even then, I can't use it freely.* (Bora, Nursing student)

Notwithstanding nursing students are limited to use ICT in clinical environments, as Bora asserts above, it is possible to use computers to access the EMR by getting permission from nurses. However, they are restricted from using the computer for other purposes, such as browsing the internet.

> *As a student, we cannot do anything else other than access the EMR. It is forbidden behaviour to use the computer for other purposes beyond accessing the EMR. If the nurses catch sight of us doing so, it will be disaster. We should maintain the discipline expected of us.* (Ari, Nursing student)

> *When I searched for medicine information within the EMR, a nurse said to me, "Why are you looking it up here and not at home?" Even when I am looking at the patient's EMR, the nurse would say, "Did you come here to use the computers?"* (Bora, Nursing student)

As another example of the discipline expected of nursing students, the students are restricted to bring and use their own personal devices during clinical placements. As was identified in an earlier section (see *6.3.1. Nursing students' general uses of ICT*), the students have had exposure to ICT throughout their lives, and have obtained a large amount of information via their personal devices. In particular, they have a higher level of dependence on smartphones than other personal devices. They believe the merits of smartphones are its convenience and greater accessibility to information.

> *After buying a smartphone, other than the time I am asleep, I am constantly playing with my smartphone.* (Garam, Nursing student)

The ICT I use the most is my smartphone. (Eunju, Nursing student)

I mostly use both my computer and smartphone, but I am more comfortable using the smartphone. This is because it is easy [to use] and has good accessibility. (Wanki, Nursing student)

However, they are not allowed to use these personal devices in the clinical environments.

Even when we use computers, the nurses would say something [not like it]… Just think about that would happen if I was to use my smartphone [in the clinical environment]. I would secretly use my smartphone in the washroom [during clinical placements]. (Bora, Nursing student)

I cannot say there was any instance where I used my smartphone during clinical placements. I have secretly gone to a separate room to use my smartphone before, but never done so openly in front of the nurses. (Dahee, Nursing student)

I don't use my smartphone. When I go out to the clinical environment, I just use the hospital computers. (Sarang, Nursing student)

Although there is no official regulation against the use of personal devices, the students believe that it is part of the discipline they should maintain. If they do not maintain this part of the discipline, they would have to worry about negative feedback from the nurses. As this context demonstrates, the students are constantly concerned about others' opinions about themselves. Particularly, they worry about leaving a negative impression of themselves on the nurses that they are not diligently participating in their clinical placements if they use their personal devices.

I am worried about appearing insincere [in my learning]. This is because usually, people would not think that I am looking something up in the dictionary, but would be more likely to think that I am texting my friends. I don't want to be seen in this way [by the nurses]. I don't want to be misunderstood. (Sarang, Nursing student)

If I use my smartphone during clinical placements, nurses would look at me and think, "She came here for clinical training but just plays with her smartphone". (Sori, Nursing student)

If I take out my smartphone, even if to look up medical information, others might

think that I am just playing around with it. I'm afraid that others will think of it that way. (Yoonjin, Nursing student)

These students' assumptions of the nurses are correct. The nurses who participated in this research indicate that they do make assumptions about the students' uses of personal ICT devices during placements.

[If nursing students uses personal ICT devices during clinical placement,] I would think they are playing with the device. (Hansol, Nurse)

I won't like it if the students use their smartphones in front of patients… If they are right next to me and I know they are using their phones for nursing-related work, I don't care. However, if I see them [using their smartphones] from a distance, I don't know what they are doing with the phones, they might be texting their friends. Actually, it shows me their attitudes. [If they use their smartphone,] I would think, 'They should be more enthusiastic during their placements, but there they are playing with their smartphones'. (Sunja, Nurse)

When a student uses a smartphone [during clinical placements], I would think that the student has a bad attitude. I have never once thought that nursing students using their smartphones [during placements] would be using it to look up information that would be useful for their placement. It doesn't look good… It could just be my stereotype against it. (Sukjin, Nurse)

6.3.3.3. Being influenced by instructional factors (Factor 3: Instructional factors)

Nursing students understand the merits of ICT in clinical use and believe that ICT allows them to obtain a large amount of clinical information, which is useful in building nursing knowledge. However, education on how to use clinical ICT is insufficient in hospitals and universities.

We have never received education regarding the ICT used in hospitals. (Ari, Nursing student)

I have never received ICT education. So, I can't use the ICT because I don't know how to use it. (Dahee, Nursing student)

Nurses confirm the students' contentions during the nurses' interviews. The nurses do not offer formal and extensive ICT education, but instead, offer minimal explanations about the ICT used in the clinical setting, especially EMR.

> *We don't provide a separate EMR training session. This is because the students are generally already exposed to ICT. Yes, they might not know what the icons indicate or where certain things are, but they will know [how to use the EMR] if they try clicking around… Usually the team nurses would open the EMR and teach the students where certain things can be found.* (Sunja, Nurse)

> *Generally, I don't teach everything about the EMR, but only things like reviewing the nursing cardex, or how to print out educational materials for patients. I don't feel the necessity [to teach everything in detail]. It is not as if that student is joining this hospital and therefore using this ICT, so I just teach them simple things that would be useful for their placements.* (Sukjin, Nurse)

Interestingly, the nurses understand why the students are required to use the EMR, although they offer minimal education to the students on how to use it.

> *I think if the students are going to see the patients, they have to know the basic information about patients. For example, why I check a patient's blood pressure and temperature frequently, why the patient is getting well or worse, and so on. In other words, to understand the patient's condition, they have to know the information [by looking at the EMR].* (Hansol, Nurse)

> *It is a fact that completing the case report is part of the process for the students. For this case report, they have to know what treatment the patient received, so it is essential to look it up on the EMR, therefore naturally, they have to borrow the nurses' ID to do so…* (Sunja, Nurse)

Moreover, the students do not receive formal education on using the EMR in university as a lecturer discloses:

> *There is no specific EMR-related teaching, but several schools [in Korea] do include nursing informatics in their curriculum during which they learn a little [about EMR]. Generally, students would take a subject in general computer education during their first year or they would get a general computer skills certificate before their graduation. Otherwise they only receive [EMR training] as newly-employed nurses. Anyhow, EMR systems differ between hospitals, so nursing schools would probably not feel the necessity of EMR education.* (Hyori,

University lecturer)

Due to this lack of education on ICT, nursing students have to learn how to use clinical ICT themselves. However, this context also disturbs the students' efficient use of ICT during clinical placements. This aspect of self-directed learning with ICT will be discussed further later.

> *We explore how to use the ICT by ourselves. Because we use it without knowing anything about it, we end up not learning anything.* (Hyemin, Nursing student)

6.3.3.4. Being influenced by environmental factors (Factor 4: Environmental factors)

Due to the difference in ICT used in clinical and non-clinical environments, such as home and university, nursing students require education in utilising ICT specific to the clinical environment. As there is a lack of education on ICT used within the clinical setting, as well as limited opportunities to use it, students therefore experience difficulty adjusting to clinical environments that are surrounded by ICT that are relatively new to them.

> *As you know, the ICT devices in clinical environments are specialised and very different from the devices we generally use, such as smartphones. There are a lot of ICT devices [in clinical environments] I have never seen before… It makes my confidence levels drop.* (Sori, Nursing student)

> *EMR is used a lot in clinical environments, right? My confidence was shaken [in using ICT], because I felt unfamiliar with using the EMR.* (Hwashin, Nursing student)

In addition, there is a lack of ICT devices such as computers that can be used by nursing students in clinical environments.

I can't use the ICT freely due to the limited number of devices. For example, if there are six nurses, they will need six computers, but there are only five computers, then there isn't any that we can even use. (Kuntaek, Nursing student)

There is usually no such thing as spare computers [in clinical environments]. So, I try to quickly use the computer while the nurses are doing other work. (Hwashin, Nursing student)

If all the nurses are charting nursing records, I would have quite a bit of time, so during then, I should find a vacant computer to use the EMR, but most of the time, there aren't any vacant computers. So, it is really hard to read the EMR. (Garam, Nursing student)

Another issue affecting nursing students' ICT usage is the difference of ICT environments between hospitals. Because of this, the students have to adjust to new ICT environments constantly as they move to other hospitals for clinical placements.

Just as each device looks different from another, its method of use is also different. Therefore even if I learnt how to use one type of that device in a specific ward, it is a different type in another hospital [so the method of use is also different, which I have to learn]. (Ari, Nursing student)

Programmes are different from hospital to hospital. There is no standardised programme and it is different between hospitals. Because of that difference, I always have to ask the nurses and learn how to use a new programme every time I start a new clinical placement. (Dahee, Nursing student)

I don't know what to do whenever I start a new placement, because ICT is different between hospitals. So it is really hard to use ICT [in the clinical setting]. (Bora, Nursing student)

Issues of confidentiality were argued earlier as a disadvantage of nursing students' ICT usage in the clinical environment. As students deal with patient information via EMR, nurses have raised concerns regarding confidentiality with regards to the students' usage of ICT in the clinical environment.

Of course I am a little worried about issues regarding confidentiality. That is because they can possibly leak patients' personal details. As students, should I say they have not reached a level where they truly understand [the implications of] confidentiality breaches? Some of them might not know what it is at all. (Hansol,

Nurse)

I have not thought about this deeply but in times like these where patient confidentiality is of utmost importance, we should think about security [of patient information]. (Sunja, Nurse)

Rather than saying it is unsafe, it makes me feel uneasy? It's hard to express it properly. I do trust the students, but I guess it is because there is the question of whether they will take the patients' information and use it somewhere else. (Sukjin, Nurse)

In this context, the students require the nurses' supervision for their ICT usage (i.e., nurses' permission) and it can stir up the issue of social hierarchy. Thus, the students' uses of ICT can be more restricted.

I need an ID and password [to use the EMR]. So I study the nurses' nunchi and when the nurse appears freer, I would then cautiously ask her to log into the EMR for me. However, if I go to the toilet for a while, the EMR [automatically logs out] and I have to ask again. (Eunju, Nursing student)

That's why as a student, I am not able to use the internet, and only the EMR [when using the computer]. Some hospitals even make us sign a patient confidentiality agreement… As I have mentioned, there are many restrictions in ICT use due to this risk of breaching patient confidentiality. (Garam, Nursing student)

I have to first ask a nurse to log into the EMR for me. The nurses may not be very friendly towards nursing students, so as they log on [to the EMR], they would say, "You know that we are not supposed to show this to you, right? So you have to keep it confidential…" (Hwashin, Nursing student)

6.3.3.5. Being influenced by emotional factors (Factor 5: Emotional factors)

The above four contextual factors influence nursing students' emotions when using ICT during clinical placements in similar ways to the nursing students' learning dynamics during clinical placements (see *5.2.2. Influential factors on learning in clinical contexts*). Contextual factors, such as requiring the nurses' permission to use

ICT (i.e., interpersonal factors), discipline within the social hierarchy in clinical environments (i.e., socio-cultural factors), a lack of ICT education for the students from both the university and hospital (i.e., instructional factors), and environmental issues, which include relatively new ICT environments, insufficient ICT devices, a lack of ICT standardisation between hospitals, and patient confidentiality concerns (i.e., environmental factors) complexly influence the nursing students' emotions with regards to ICT use. These influences are mostly negative.

> *There are several points for us to consider with regards to using ICT during clinical placements. It really does stresses us out.* (Yoonjin, Nursing student)
>
> *Using ICT in clinical environments can be very difficult on me psychologically.* (Wanki, Nursing student)

Moreover, nursing students have emotional burdens when using 'clinical' ICT during clinical placements, as they believe their usage can have a negative effect on the ICT systems as well as patients.

> *I am worried that I would either accidently damage the ICT, or if I do not save it properly I could accidentally delete [the medical records]. I think my [ICT] competency is 80%. I have the competency but because I am worried, I am too afraid to touch it.* (Bora, Nursing student)
>
> *Even just now with the EMR, the reason why I couldn't just try clicking on any button is that I'm afraid of clicking the wrong thing by mistake and deleting the medical record. That becomes medical malpractice. I am really afraid of causing that… Medical ICT may be similar [to the ICT I am competent with] but because I get scared, I can't seem to use it.* (Dahee, Nursing student)

6.3.4. Nursing students' responses to the five influential factors of ICT usage

Nursing students' responses to the five influential factors of ICT usage are similar to

their responses to the educational dynamics within the clinical environment (as was discussed in *5.2.3. Nursing students' responses to the six influential factors*). An understanding of the nursing students' responses in the former section would therefore enhance our understanding of their responses regarding ICT usage during clinical placements.

Due to the influence of the five influential factors discussed thus far, many nursing students have negative experiences of ICT usage in clinical environments. However, they recognise and conform to the situation of experiencing limitations in using ICT during clinical placements due to their role as a student:

> *I am aware there is a limit to our ICT usage in clinical environments*. (Garam, Nursing student)
>
> *I haven't been able to use ICT much during clinical placements and I know that [hospital ICT] devices are not frequently given to students [to handle].* (Wanki, Nursing student)

Furthermore, it has been clearly identified that nursing students use the nunchi mechanism when they use ICT in clinical environments.

> *We are influenced by nunchi even when we use ICT.* (Bora, Nursing student)

In many cases, the students particularly use the negative nunchi mechanism when using ICT during clinical placements due to their social positions as students (i.e., negatively study nurses' nunchi). This negative nunchi mechanism becomes an obstacle to using the EMR and the internet:

1) EMR

> *I have to study nunchi to look for an opportunity to use ICT... That makes me feel*

uncomfortable. The ICT that students can use is probably just the EMR, but because we feel the nurses' nunchi, even using that is difficult. (Eunju, Nursing student)

As we can feel the nurses' nunchi, I feel we are given relatively few opportunities to use ICT in the hospital. (Hyemin, Nursing student)

Because I study nunchi... If I sit on a chair in the nursing station for just a little while, I might get scolded [by the nurses], so, because I am scared [of being scolded], I rarely sit down. However, because I have to do my case report, I have no choice but to sit on a chair [while using the EMR]. I would therefore study nunchi and ppalli-ppalli (i.e., quickly quickly) look up the information on the computer. (Dahee, Nursing student)

2) Internet:

I saw the nurses using the internet, [but we can't use the internet like they do]. We are busy just trying to use the EMR [while studying nunchi]. If we try to use the internet, we feel more of the nurses' [negative] nunchi [than when using EMR]. (Yoonjin, Nursing student)

I feel the nurses' nunchi when I use both the EMR and internet… It is better go to the washroom to use my smartphone [to search for information]… Even though there are no problems in using the EMR, there is a fixed time during which I can use it, so I still feel [the nurses'] nunchi. That's why if I use the internet, I would feel more nunchi. (Wanki, Nursing student)

During clinical placements, I use the internet a lot. If the nurses give me homework, I have to look up information on the internet a lot. But of course, only at home, because it is really hard to use the internet in clinical environments. (Garam, Nursing student)

Nursing students' negative study of nunchi while using ICT in clinical environments necessarily influences their confidence of using ICT during clinical placements. It has been identified through the nursing students' interview quotations that the nunchi mechanism decreases their confidence.

When I go to hospital, my confidence of using ICT is decreased, because I have to study nunchi. (Bora, Nursing student)

I think there is a bigger psychological impact… When I use the computer [in clinical environments], I get nervous because I don't know when the nurse will come back. Due to this clinical atmosphere, my confidence has dropped… The

> *reason for the drop in my confidence of using ICT in the clinical environment is complex, but the topmost reason is nunchi, second is fear, and third is having to study on my own.* (Yoonjin, Nursing student)

Along with above influences of nunchi, which is largely is affected by the interpersonal and socio-cultural factors, on the nursing students' ICT usage, the lack of ICT education also has an impact on the drop in their confidence of using ICT during clinical placements.

> *My confidence has dropped a lot. Because, we have never received formal training of ICT and the time we are allowed to use ICT is limited. So, I don't think we have much chance to become proficient [in using clinical ICT].* (Eunju, Nursing student)

> *My confidence [as compared to normal times] of using clinical ICT during clinical placement drops a lot because I don't know how to use it and there is a lack of ICT education.* (Ari, Nursing student)

Nursing students' decreased confidence in the use of ICT due to the five influential factors and their response to these factors (i.e., the negative nunchi mechanism) becomes a bigger burden to them, as their decreased confidence is interlinked with the unique characteristics of clinical environments and their own role (i.e., caring for patients' lives). The caring nature of their role aggravates their reduced confidence in the use of ICT. In other words, nursing students are worried that their decreased confidence in ICT use can cause a negative effect on patients, and this worry further decreases their overall confidence. For the students, it thus becomes a vicious cycle of decreasing confidence levels.

> *I need more training [in ICT]. As I don't know [how to use it], I can't utilise it… Especially because hospital ICT is connected to the patient's life… So, I am afraid to use clinical ICT devices… [As a result,] my confidence is reduced.* (Dahee, Nursing student)

> *First of all, I don't exactly know how to use clinical ICT. If I misuse the ICT, I will be in big trouble, because patients' lives depend on it. Therefore, my confidence*

[in using ICT] decreases even more. (Sori, Nursing student)

This finding that nursing students have a lack of confidence in using clinical ICT can be compared with the findings of the quantitative research. In the quantitative research, it was discussed that 1) nursing students' attitudes towards ICT confidence are less positive than other two attitudes such as care value of ICT and training of ICT skills and 2) their coefficient of ICT utilisation significantly dropped.

Despite the many limitations for using ICT during clinical placements, they express desire to use EMR during the placements.

> *I wish to be able to freely use ICT [in clinical environments]… I also want to learn a lot about the use of ICT [in clinical environments].* (Dahee, Nursing student)
>
> *If it is a context in which the nurses are not able to educate us, I think it would be better if we were allowed to use the computers more so that we can get more information [to make up for the lack of education from the nurses].* (Ari, Nursing student)
>
> *I hope I am able to use ICT more during clinical placements.* (Wanki, Nursing student)

Nursing students should use ICT for their learning. This is because they are required to investigate patients' information via ICT, especially through the EMR, to not only complete their assignments (i.e., case report) but also to understand the clinical contexts as part of their nursing education process. As was identified in the instructional factors and quantitative research, they '*attempt'* to learn how to use the EMR by themselves and attempt to use it during the placements. Namely, they conduct self-directed learning in the unsupportive clinical contexts.

6.4. Conclusion

Nursing students' uses of ICT during clinical placements have been discussed in this chapter. This chapter consists of two parts by way of two different methodologies used, 1) quantitative and 2) qualitative research.

In the quantitative research, the development of the shortened version of ITASH proved to be both reliable and valid, and nursing students' attitudes towards ICT can be easily and quickly captured using the ITASH. Findings of the attitudes from the ITASH have also been interpreted. Although nursing students' attitudes towards the care value of ICT and training of ICT skills are clearly positive, those of ICT confidence and workload value of ICT are less positive. The reason for less positive attitudes is related to their limited use of ICT in clinical environments, as was discussed with the nursing students' lower coefficients of ICT utilisation in clinical environments. Due to the students' social position, they are not given many chances to use ICT. Thus, their confidence would be relatively neutral with regards to using ICT in clinical environments. As they are limited in using ICT in clinical environments, it can be assumed that they do not have enough opportunities to fully explore the workload value of ICT and this circumstance would cause them to maintain a relatively neutral position. Furthermore, the less positive workload value may also be the result of the students' belief that ICT increases nurses' workloads. Similarly, it can be interpreted that they are positive in their attitudes towards training of ICT skills due to the lack of ICT education and their limited use of ICT in clinical environments. It is also verified that nursing students understand the benefit of ICT for their knowledge building during clinical placements, because they are able to obtain clinical information by using ICT.

Therefore, their use of ICT in clinical environments should be promoted so that the students can build proper nursing knowledge and further increase all attitudes, especially with ICT confidence and workload value of ICT, beyond their current attitudes.

Similar findings to the quantitative research were discovered in the qualitative research. Nursing students' uses of ICT during clinical placements were influenced by five factors. When they wanted to use ICT, they were required to receive the nurses' permission (interpersonal factors). They were restricted to use ICT due to strong social hierarchy and the discipline expected of them (socio-cultural factors), and they suffered a lack of clinical ICT education from both the hospitals and universities (instructional factors). In the environmental factors, several issues were dealt with such as difficulties adjusting to relatively new clinical ICT environments, a lack of ICT devices for them to use in clinical environments, no standardisation of ICT systems between hospitals, and the issue of patient confidentiality affecting their ICT usage in clinical environments. These four factors caused emotional burdens to the nursing students. Additionally, they were worried that they would make mistakes while using clinical ICT, which caused extra emotional burdens (emotional factors). These five factors resulted in mostly negative responses from the nursing students regarding ICT use in clinical environments. They used the negative nunchi mechanism while using ICT in clinical environments and their confidence of using ICT had decreased. Moreover, they attempted to learn how to use clinical ICT by themselves due to the lack of ICT education. For better and richer understandings of the above findings (i.e., nursing students' uses of ICT in clinical placements), it would be valuable to

understand them alongside the findings of Chapter Five, which explored nursing students' learning process of clinical placements.

From both the quantitative and qualitative approaches in this research, it was evident that nursing students used ICT as a tool for processing clinical information (i.e., obtaining and sharing information) in clinical environments. ICT, as a tool, facilitates the connection between student and a vast amount of information, and this connection promotes their nursing knowledge building, as was discussed in Chapter Four.

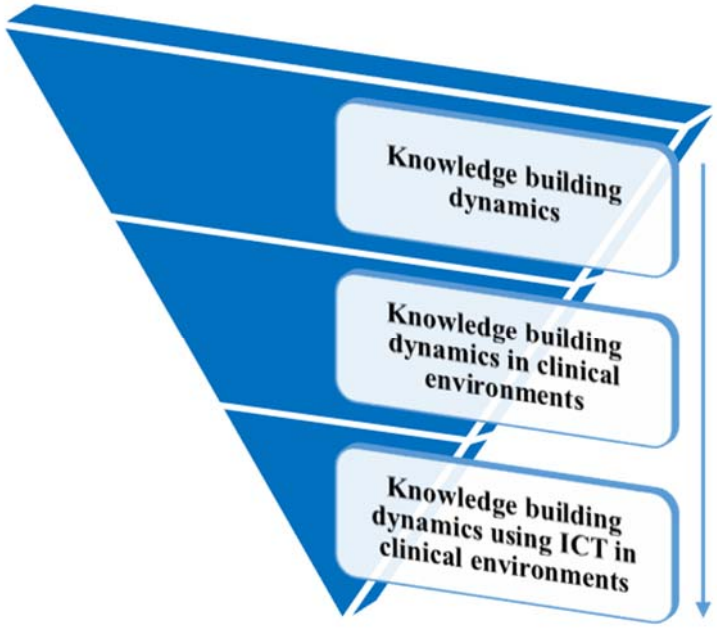
Although ICT can facilitate the acquisition of information, which is vital for knowledge building, nursing students are struggling to use it for this purpose during clinical placements. However, they accept the limitations to their learning during clinical placements, and would like to obtain nursing information via the EMR to complement their learning. For nursing students to properly use ICT in clinical settings, clinical ICT education should precede their arrival here and a conducive clinical atmosphere for nursing students to use ICT should be created. Nursing students' proper use of ICT during clinical placements would promote effective knowledge building as they are able to obtain sufficient nursing information via ICT.

CHAPTER SEVEN: DISCUSSION AND CONCLUSION

7.1. Introduction

This research aimed to discover nursing students' dynamics of constructing knowledge, particularly with the use of ICT in clinical environments and to construct a theory based on the discovery. This research has introduced its findings through the former three chapters: nursing students' knowledge building dynamics (Chapter Four), knowledge building dynamics in clinical environments in the context of nursing education (Chapter Five) and knowledge building dynamics using ICT in clinical environments (Chapter Six) (see Figure 13).

Figure 13. The scope and flow of this research



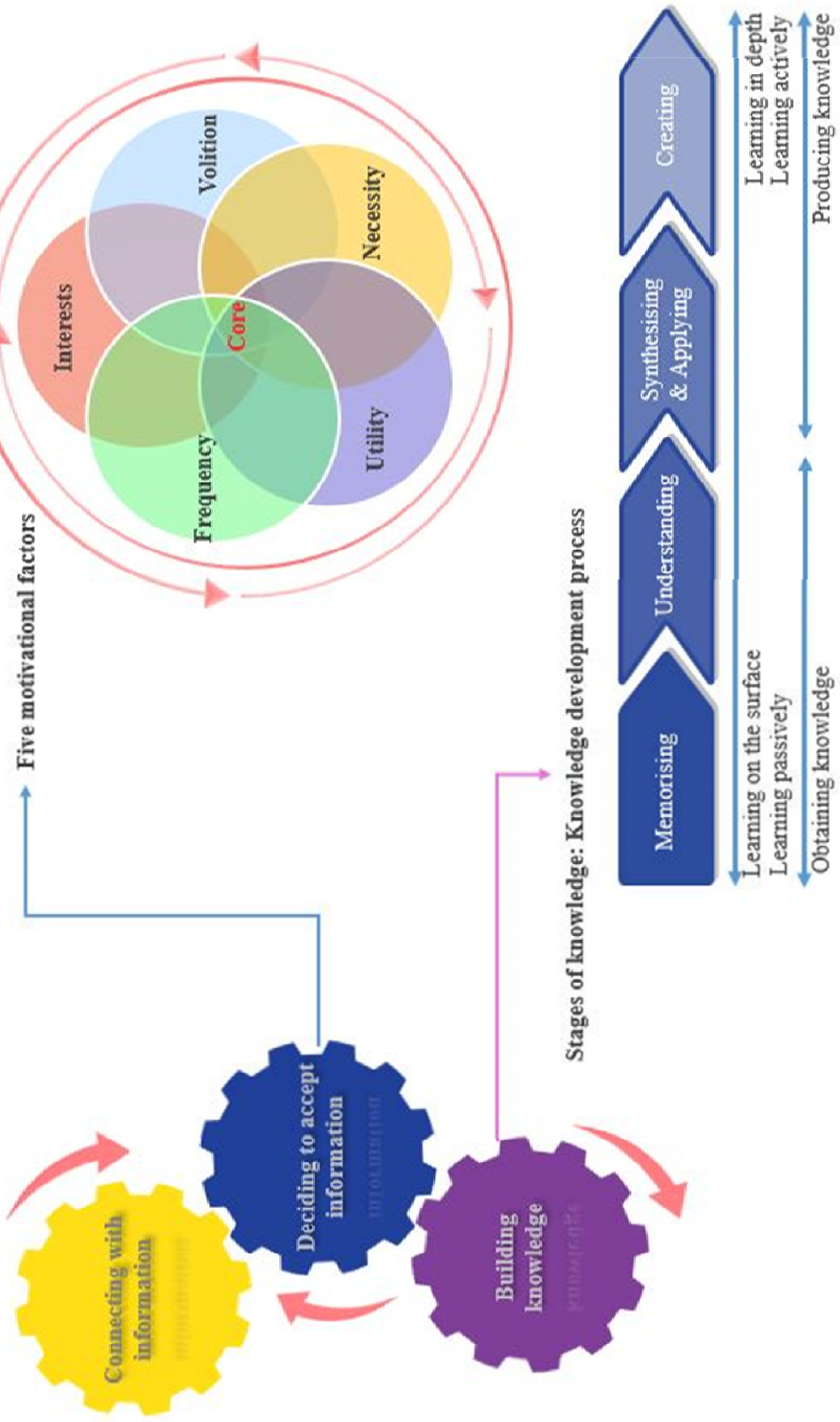
In this chapter, the findings will be discussed in relation to existing literature.

7.2. Nursing students' knowledge building dynamics

7.2.1. Theoretical model: Knowledge Building Dynamics Model (KBD Model)

An integration of the findings in Chapter Four can be visualised as a theoretical model of knowledge building dynamics (i.e., KBD Model) (see Figure 14). The following sections will discuss the properties of this model with existing literature.

Figure 14. Theoretical model: Knowledge Building Dynamics Model (KBD Model)



7.2.2. Relationship between information and knowledge

The exploration of what knowing (or knowledge) is has been one of the big questions for human beings. There have been ceaseless efforts to answer the question but arguably, no one has answered the question clearly yet (Stenmark, 2001).

This research did not aim to explore what knowledge is, but rather to discover the dynamics of how nursing students construct knowledge in nursing studies. However, I returned to the classic question 'What is knowledge for nursing students?' in order to explore the dynamic. That is to say that this research explored how nursing students understood knowledge as well as information, and what processes they go through to construct knowledge.

As a first step, this research explored the definition of information and knowledge, and its relationship in Chapter Four. The dictionary definition for information is "*facts about a situation, person, event, etc.*", and knowledge is "*understanding of or information about a subject that you get by experience or study, either known by one person or by people generally*" (Cambridge Dictionary Online, 2014).

In the literature, the definitions of the two terms have been explored mainly in the academic fields of information science and knowledge management (or business) (see Table 26).

Table 26. A collection of definitions of information and knowledge in a variety of academic fields

	Information	Knowledge
Wiig (1993)*	Information consists of facts that details a particular circumstance or condition	Knowledge is one's truths, beliefs, viewpoints, judgements and methodologies
Nonaka (1994)*	Information is a stream of data and delivers meaning in a specific context	Knowledge is generated and sorted by the stream of information, grounded upon an individual's own values and perspectives (personal beliefs)
Davenport and Prusak (1998)*	Information is processed data, by which an individual gives meaning to the data	Knowledge is processed information, by which an individual adds values such as insight, contexts, interpretation of the information
Alavi and Leidner (2001)*	When individual's knowledge is articulated in any verbal form, the knowledge becomes information	Knowledge is personalized information resulting from cognitive processes activated by factors of stimuli
Kettinger and Li (2010)**	As data and knowledge acting together, information is produced from the interaction of data and conceptually predicted outcomes in knowledge	Knowledge expresses the relationship between concepts that are embedded in data (data are facts or conditions)
Dalkir (2011) *	Information consists of material that can be illustrated by interpreted data	Knowledge is knowing something on a more personal level, based on one's own attitudes, beliefs, perspectives and experiences

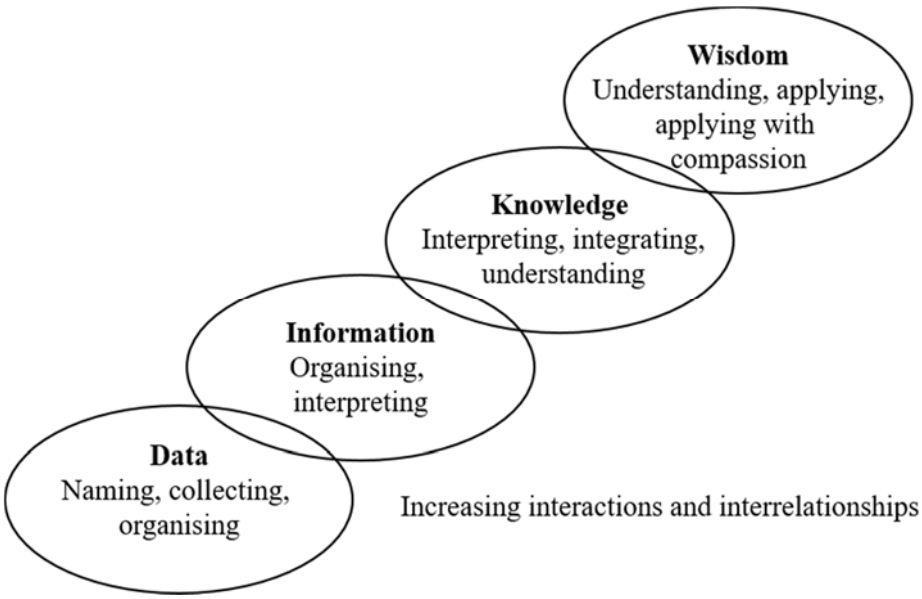
Note: * = Knowledge management field; ** = Information science field

Although the authors differ in their definitions of information and knowledge, the definitions share several similar characteristics. For instance, the authors consistently define information as consisting of data and facts but also can contain meaning, while knowledge is defined as a personalised product that engages individual beliefs, judgments, and values.

As shown in the above table, it has also been identified that diverse and/or controversial relationships between information and knowledge exist. For example,

Davenport and Prusak (1998) asserted that data are processed to become information and that information is processed to become knowledge (i.e., data → information → knowledge), while Kettinger and Li (2010) believed that data and knowledge are processed to become information (i.e., data + knowledge → information). In the academic fields, the processing model from data to information to knowledge has been conventionally and popularly advocated by many researchers (Alavi & Leidner, 2001; Stenmark, 2001). Particularly, its hierarchical and sequential model from data to knowledge is one of the most cited concepts of the relationship between data, information and knowledge (Alavi & Leidner, 2001), notwithstanding the order within that relationship has been criticised by some researchers such as Tuomi (1999) and Kettinger and Li (2010). The hierarchical relationship also dominates the field of nursing informatics (Matney *et al.*, 2011). In the nursing field, Nelson's (2002) data-information-knowledge-wisdom (DIKW) model that was developed from Graves and Corcoran (1989) and Blum (1986) was the most popularly cited (see Figure 15).

Figure 15. Data, information, knowledge, wisdom model (Nelson, 2002, p13)



However, unlike this research, there have been rare attempts to critically review the existing definitions and to newly define information and knowledge in nursing studies, despite some attempts to analyse and adopt it. For example, I searched for articles using the Medline database with the keywords 'information', 'knowledge' and 'nursing'. Fifty four articles were reviewed but none of them made an effort to define the two terms within the nursing education field. Rather, some of them adopted the above DIKW model, such as Erdley (2005) and Hasna (2009).

Amongst the above definitions, Alavi and Leidner's (2001) definitions of information and knowledge closely resembled those of this research. In the findings of this research, information and knowledge were found to be essentially based on the same sources but were classified by the location of existence: knowledge exists internally in one's mind in contrast to information that exists externally to one's self. Information becomes knowledge through processes of subjectification and internalisation, reinforcing that the formation of knowledge is influenced by one's interpretation or epistemological belief. Alavi and Leidner (2001) also believed that knowledge is subjective and when the knowledge is verbalised, it becomes information through an interrelated process. This supports the finding in this research that when the nursing students' knowledge is expressed to others, that knowledge undergoes another transformation to become information to the others. A back-and-forward process therefore exists between information and knowledge, confirming the reciprocal dynamics between the two, as was demonstrated in Chapter Four. While it can be said that the process of information becoming knowledge in this research is similar to Nelson's (2002) model, it has been identified that there was no hierarchical

relationship. Rather, the relationship between information and knowledge was found to be horizontal. The condition of knowledge becoming information in this research is alike Tuomi's (1999), although his model (i.e., knowledge → information → data) denied the process of information becoming knowledge. Both Tuomi (1999) and Nelson (2002) only introduced one-way processes between information and knowledge, but this research proposes to consider the process as two-way. For example, data and information can be used to create one's knowledge, and conversely that knowledge can be used to generate data and information.

Interestingly, all the abovementioned literature defining information and knowledge were not based on empirical evidence, but based on philosophical and theoretical assumptions. This highlights the need to define the two concepts and their relationship through words used by ordinary persons in their daily lives (Alexander *et al.*, 2012). Moreover, the understanding of the persons' perspectives regarding the concepts offer meaningful evidence to support the philosophical and theoretical assumptions.

During the literature review, one empirical research article was found. In comparison with the above philosophical and psychological research studies, Alexander *et al.* (2012) conducted a study investigating university students' ideas of the definitions of information, knowledge, and truth, similar to this research. The participants of their research mostly defined knowledge as firstly, "*information that has been transformed in some fashion (e.g., learned, acquired, processed, interpreted, or understood*)" (p. 10), and secondly, as internalised information residing in one's mind. These two definitions of knowledge closely overlap the definition of knowledge in this research. As for information, Alexander *et al.* (2012, p. 11) demonstrated that the participants

view information as "*raw data and facts that are given*". This corresponds and supports this research's definition of information existing outside of oneself. Alexander *et al.* (2012) also found a cross-fertilisation in the use of the two terms. Namely, the majority of participants use the word 'information' when defining 'knowledge', and vice versa, finding it difficult to define either term without the other. Thus, conceptual interrelations between the two can be deduced from their research, corresponding with the mutual relationship determined between information and knowledge in this research (Alexander *et al.*, 2012).

7.2.3. Motivational factors to build knowledge

After determining the definitions and the mutual relationship between information and knowledge, this research discussed the nursing students' learning process of connecting with information to the building of knowledge based on their decisions on whether to accept certain information. As an individual's knowledge is information that has been internalised and subjectified, the individual is required to consciously select (or decide) the information around him or her in order to build knowledge.

Nursing students' cognitive decisions regarding information can be explained by a philosophical concept of 'intentionality'. Searle (1983, p. 1) defined intentionality as "*property of many mental states and events by which they are directed at or about or of objects and states of affairs in the world*". Similarly, Brentano (1995, p. 272) believed mental states as "*What is characteristic of every mental activity is ..., the reference to something as an object*". As the above two philosophers explained,

referencing to an object is the result of the subject's mental activity (e.g., thought, judgement and awareness) towards the object that exists in the world outside of the subject. Thus, without the mental activity (or consciousness) regarding the object, the subject is not able to notice the object's existence. In relation to this research, the nursing students' intentionality can be regarded as a mechanism to recognise the 'objects' (i.e., information in this research). As such, knowledge building is a mental activity that starts with recognising information (the object) around the nursing students (i.e., the subject), corresponding with 'connecting with information', and then referencing to the information to accept it to be knowledge, corresponding with 'deciding to accept information'.

In the decision-making process, this research found five motivational factors (i.e., interest, necessity, volition, utility, and frequency) that activate the nursing students' cognitive processes of learning and influence the nursing students' intentionality. These factors have been discussed as learners' motivational factors in the literature (Greene, 1984; Sansone & Harackiewicz, 2000; Casim & Yang, 2012; Richardson *et al.*, 2012). Particularly, Richardson *et al.* (2012) carried out a systematic review and meta-analysis to explore psychological factors related to university students' learning. In their literature review, they found five non-intellective components that influenced students' academic performance, such as 1) personality traits, 2) motivational factors, 3) self-regulatory learning strategies, 4) students' approaches to learning, and 5) psychosocial contextual influences. In the motivational factors, they subdivided it into12 factors and the 12 factors were categorised into three domains again, as: a) attributions, optimism, pessimism, expectancies, and perceived control, b) sources of

motivation, and c) goal types (Richardson *et al.*, 2012). These three domains can also be referred to as mechanisms of motivation, and each has unique properties. The first mechanism refers to a learner's epistemological perception (or belief) towards his/her learning process such as attributions, self-esteem and self-efficacy regarding learning. The domain of sources of motivation presents a learner's motivational reasons to engage in his/her learning process. In particular, this domain was further divided into two categories of intrinsic and extrinsic motivations. Intrinsic motivation is self-motivation for the pleasure of learning (e.g., learning interests) while extrinsic motivation is for instrumental reasons (e.g., rewards by a teacher or parents). The last domain (i.e., goal types) refers to a learner's goals that drives his/her learning process, such as learning for new knowledge (i.e., learning goal orientation), showing his/her performance in relation to others (i.e., performance goal orientation), and avoidance to fail an academic course (i.e., avoidance goal orientation) (Richardson *et al.*, 2012). As the third domain affects the second domain (Richardson *et al.*, 2012), interrelationships between the two domains can be confirmed. As analysed in Richardson *et al.* (2012), Pintrich *et al.* (1991) defined 'goal orientation' as 'why' the learner decides to engage in a learning process, and divided it into intrinsic (e.g., challenge, curiosity and mastery) and extrinsic (e.g., academic grades and evaluation by other people) factors. This definition was noted to differ from Richardson *et al*.'s (2012) definition of 'goal types', and instead, was noted to very closely resemble Richardson *et al*.'s (2012) definition of 'sources of motivation'. The non-correspondence of the definitions is likely due to the combined analysis of other literature conducted by Richardson and colleagues (2012). This, in fact, indicates that the boundary between the second and third domains described in Richardson and

colleagues' (2012) study ('sources of motivation' and 'goal types') is blurred, due to the overlap and correlation between the constructs in both domains as defined by earlier researchers. Moreover, the first domain can affect both the second and third domains due to its focus on the individual learner's internal mechanisms, while the second and third domains consider external learning contexts (i.e., extrinsic mechanism of learning).

In this research, the motivational factors can refer to their reasons to decide on which information is to become knowledge (i.e., reason to engage learning process), such as nursing students' varying interests in nursing studies and the prediction of utility of nursing information. Moreover, their learning process goals in nursing studies (e.g., building nursing knowledge and becoming a nurse) are also closely connected to those reasons. Therefore, it can be deduced that Richardson *et al.*'s (2012) second and third domains can be matched with the motivational factors in this research. Although I acknowledge that the properties of Richardson *et al.*'s (2012) first domain can be deeply engaged with nursing students' motivational factors, I omitted the first domain from this discussion section in comparison to my model. This is because, due to the methodological limitation of GT, the categorisation of codes focused on finding common traits between codes. As the first domain involves the consideration of individual epistemological perspectives on learning (i.e., individuality), it was concluded that it would be difficult to compare it with findings that have arisen from common codes. This aspect can be a limitation of this research.

As the two previous studies did so (Pintrich *et al.*, 1991; Richardson *et al.*, 2012), the motivational factors found from this research can also be divided into intrinsic and

extrinsic factors. Nursing students' interest and volition can be regarded as intrinsic factors, whereas the necessity, utility, and frequency can be grouped as extrinsic factors. Example quotations are available in Table 27.

Table 27. Intrinsic and extrinsic factors of nursing students' motivation

	Factors	Name	Quotations
Intrinsic factors	Interest	Dahee	*My individual interests influence [the knowledge building process]*
	Volition	Hwashin	*The volition to learn is just the beginning [of my learning]*
Extrinsic factors	Necessity	Miran	*The contexts around me demand [the acquirement of necessary nursing information]*
	Utility	Hyemin	*I obtained information about neuroscience care nursing. If I predict to utilise this information during my presentations or in my nursing placements later, it will become knowledge*
	Frequency	Junho	*If I frequently find the same information during my clinical placements, it can be my knowledge*

Similar to Pintrich *et al.* (1991) and Richardson *et al.* (2012), while the motivational factors for deciding on which information to accept have been conceptually divided into five factors, the boundaries between each are blurred. Rather, as previously discussed in Chapter Four, collaborations and interactions between the five motivational factors can bring about a stronger motivation for the nursing student in his/her decision-making process.

Based on the literature that divided learners' motivations into intrinsic and extrinsic factors, I returned to my interview dataset and I discovered that several nursing students were more influenced by extrinsic learning factors than initially thought. They disclosed that they were motivated to study nursing due to extrinsic reasons as shown in Table 28.

Table 28. Nursing students' reasons to study nursing

Name	Quotations
Ari	*I definitely didn't come here [the nursing department] because I wanted to… I really wanted to study business administration, but people around me strongly urged me to enter the nursing department. My parents told me I most definitely have to do nursing studies, otherwise they would not allow me to attend university at all. Others also said that while it is hard to get employed in Korea, I would easily get employed if I do nursing. However, now if you ask me why I am doing it now, since I have studied nursing, I realised that nursing is a really good profession and it fits me. So I am satisfied now*
Eunju	*I was influenced by my mother as she herself did nursing studies. Moreover, I didn't have a clear dream [for my career] until the end of my secondary school period, just thinking between nursing studies or the English department. During getting a career counselling session with my form teacher, the teacher advised that there is nothing I can do after graduating from the English department, and recommended nursing studies as I will be able to gain employment quickly after graduation*
Bora	*When I was in my final year of secondary school, I heard that [graduates of] nursing studies have good employment opportunities. My parents also wanted me to study nursing, and I also thought nursing would be a good fit for me... I don't have to worry about getting employed, and it might be tough, but I think it is a good job. The pay is good and as a woman's profession, it is a job I can do for a long time*

As was shown in Table 28, many nursing students chose nursing studies mainly due to the assessed necessity and utility of nursing studies, rather than following their intrinsic motivational values.

Meanwhile, in Chapter Four, it was also discussed that nursing students firstly used paper textbooks to obtain nursing information while digital resources were secondarily utilised when further information was desired. This finding is supported by many studies. For example, Dee and Stanley (2005) identified that nursing students preferred to use textbooks as they offered reliable and concise information, while they also used

electronic resources due to the training they received on using the university resources. Carter-Templeton *et al.* (2013) also reported that the majority of nursing students (88%) preferred to use nursing textbooks for up-to-date EBP, whereas only 45% nursing students utilised the internet resource to look up nursing practice.

Here, the preference for paper textbooks would be closely related to the extrinsic motivational factors of necessity and utility. One of the reasons the students preferred textbooks was that since the nursing examination questions were based on textbook contents, they would thus presume that they would have to use textbooks to achieve good marks. Moreover, another reason for preferring textbooks was due to their perceptions that it is one of the conventions of nursing education and that they should abide by it. This reason is also linked to the extrinsic factors by way of necessity. On the other hand, a reason for using the digital resources for their nursing education was that they were able to expand and extend their knowledge due to the high accessibility to a large amount of information. This expansion and extension of knowledge would be grounded in their curiosity, interest and/or volition (i.e., intrinsic factors).

The findings have so far demonstrated that the participating nursing students tended to be more motivated by extrinsic factors than intrinsic ones. This tendency can be explained by the characteristics of Asian students having been nurtured amidst collectivist cultures in Asian countries (Kember, 2000). Many educationalists such as Biggs and Watkins (1996), Kember (2000) and Yu (1996) have argued over the dichotomised attributes of Eastern and Western learners. Eastern learners who are influenced by the Confucian culture are socially-oriented and put greater value on satisfying their families, whereas Western learners are oriented to achieve individual

goals (Chan & Rao, 2010).

Extrinsic motivations are often described negatively as they can lead to surface learning, while intrinsic motivations are regarded as ideal and advisable as a precondition of deep learning (Fox *et al.*, 2001; Chan & Rao, 2010; Richardson *et al.*, 2012). However, extrinsic motivations should not be matched only with surface learning. Biggs and Watkins (1996) argued that Asian learners, who were mostly affected by extrinsic motivational factors, would use their own learning strategies to adapt to their context so as to conduct effective in-depth learning. This confirms that a learner's motivation for learning is related to his/her socio-cultural background, providing the reason and support as to why the Korean nursing students who participated in this research, influenced by their collectivist socio-cultural background, were more affected by extrinsic motivational factors than intrinsic ones.

7.2.4. Stages of knowledge

After completing their decision-making, nursing students can build nursing knowledge through different stages: memorising, understanding, synthesising and applying, and creating. The higher stages of knowledge such as synthesising and creating can be regarded as the results of more active and deeper learning than those of lower stages.

There have been many debates of the separation of surface learning from deep learning in the fields of education and educational psychology such as Tait and Entwistle (1996), Entwistle and Entwistle (2003) and Ford *et al.* (2003). These researchers explained the properties of surface learning as 1) intending to reproduce information, 2) memorising

without establishing links between ideas (or prior knowledge), 3) passive learning, and 4) dreading failure, whereas deep learning was characterised by 1) intending to understand, 2) establishing links between ideas (or prior knowledge), 3) utilising evidence, and 4) having active attitudes toward learning. Based on the above rationale, learning via memorisation is frequently regarded as surface and passive learning, while learning via understanding is considered as deep and active learning. By way of an idea, knowledge from memorisation and knowledge from understanding can be distinguished in the learning process and it is conventionally regarded that understanding is a more developed, or higher, concept than memorisation in learning. This idea is reflected in the findings of this research with regards to the stages of knowledge built (i.e., knowledge from understanding requires more active approaches than knowledge from memorisation). The properties of deep learning, or understanding, can be interpreted to share some common characteristics with the third stage of knowledge (i.e., synthesising and applying), such as establishing links between prior knowledge and utilising evidence. However, the participating nursing students in this research divided understanding (i.e. deep learning) into two detailed concepts as they believed 'synthesising and applying' required higher cognitive abilities than solely understanding.

Although understanding is a higher stage of knowledge than memorisation, it was identified in Chapters Four and Five that the nursing students relied more on memorisation during their learning process, at the expense of other higher learning goals such as understanding, synthesising and applying. Similar to the extrinsic motivation that many Asian students have been found to have, the phenomenon of

relying excessively on memorisation of information is common amongst Asian students and it is expected that this phenomenon would cause poor academic results, especially in Western educational contexts (Watkins & Hattie, 1981; Entwistle & Entwistle, 2003). However, there is much evidence (e.g., Kember (1996), Marton *et al.* (1996) and Dahlin and Watkins (2000)) asserting that memorisation is one of several processes involved to reach understanding, and thus, Asian learners who rely more on memorisation should not be considered to learn badly in comparison to Western learners. In particular, Kember (1996) argued that many Asian students memorise information for their understanding of the material during their learning process (i.e., memorisation for higher stages). Therefore, he stressed that memorisation should be understood as a continuum to achieve higher levels of learning, rather than be considered only as surface learning (Kember, 1996). Miran, a student participant in this research, also supported this argument as below:

> *Even if I understand [something], I might not be able to memorise it… [Conversely] if I have memorised something, understanding is easy… I can later combine the knowledge from memorisation with the knowledge from understanding.* (Miran, Nursing student)

For this reason, I also consider the four stages of knowledge in this research as a continuum, and labelled the four stages of knowledge as the nursing students' knowledge development process. However, it should be noted that memorisation is still classified as the lowest stage of knowledge in this research, compared with other stages of knowledge.

In another perspective of the stages of knowledge, Bloom (1956) introduced the taxonomy of educational objectives, which refers to the classification of educational

goals and identified three domains. In the cognitive domain, he developed the six major categories of knowledge structure: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation. Anderson and Krathwohl (2001) later updated the taxonomy to make it fit the 21st century and modified the six categories to 1) remember, 2) understand, 3) apply, 4) analyse, 5) evaluate, and 6) create. The properties of both the original and revised taxonomy are available in Table 29.

Table 29. Blooms' taxonomy of educational objectives and its revised version

The Taxonomy of the Cognitive Domain by Bloom (1956)	
Knowledge	the remembering of learned information by recall or recognition
Comprehension	the understanding of the literal form of message by considering one's translation, interpretation and extrapolation
Application	the use of learned information, that requires the comprehension, including its principles, methods and theories
Analysis	the breakdown of learned information into its constituent parts to understand the structure in which the information is organised
Synthesis	the combination of several components to formulate something new
Evaluation	the assessment of the value of information based on specific criteria
Revised Bloom's Taxonomy by Anderson and Krathwohl (2001, p. 30)	
Remember	*Retrieving relevant knowledge from long-term memory*
Understand	*Constructing meaning from instructional messages, including oral, written, and graphic communication*
Apply	*Carrying out or using a procedure in a given situation*
Analyse	*Breaking material into constituent parts and determining how parts relate to one another and to an overall structure or purpose*
Evaluate	*Making judgments based on criteria and/or standards*
Create	*Putting elements together to form a novel, coherent whole or to make an original product*

The six categories in both taxonomies are sequenced in a cumulative hierarchical order of cognition (e.g., the '*remember*' is the lowest level of knowledge structure, while the

'*create*' is the highest level in the revised taxonomy). Notwithstanding the properties of each category are closely similar between the two versions, the revised version changed the word form of each categories from noun to verb, as action words, bringing about a more dynamic nature of learning. It also changed some name categories (e.g., knowledge to remember and synthesis to create). Moreover, the revised version changed the hierarchical order of synthesis (5^{th} level) and evaluation (6^{th} level) in the original taxonomy to 'evaluate' (5^{th} level) and 'create' (6^{th} level) (Anderson & Krathwohl, 2001).

The six 'categories of educational goals' may not reside in the same dimension as the four 'stages of knowledge' that were introduced in this research. In particular, as it can be clearly found in the 'remember' category, Anderson and Krathwohl (2001) already assumed that prior knowledge already exists in their categories as they explained the properties of each of the six categories. Conversely, this research focused on the building of new knowledge (although I accept the influence of prior knowledge, especially in the 'synthesising' stage). However, the revised taxonomy of educational goals by Anderson and Krathwohl (2001) and the four knowledge stages in this research share some common characteristics:

1) The learner's higher levels of cognitive processing and knowledge are required as the learner's learning goal in the revised taxonomy advances or as the learner advances through the four stages of knowledge in this research,
2) The process to attain a higher level of educational goal or stage of knowledge is similar (e.g. this research: memorising→ understanding→ applying→

creating and the revised taxonomy: remember→ understand→ apply→ analyse→ evaluate→ create), and

3) The cumulative process in the taxonomy can be found in this research, especially in the third and fourth stages of knowledge (the first and second stages should precede the third and fourth).

Thus, the literature supports the findings of learning – That, regardless of the level at which is occurs, learning consists of a series of cognitive processes that proceed in a stage-like manner.

7.2.5. Conclusion of nursing students' knowledge building dynamics

The findings of this research identified 1) a relationship between information and knowledge, and 2) an integrated viewpoint of nursing students' knowledge building dynamics as a learning process.

In the relationship between information and knowledge, this research has generated definitions and properties of information and knowledge, both of which share some common aspects with existing academic literature. This research defines the information and knowledge as below:

1) Information: Recognised facts by a person, which is non-subjective and located around the person, and not internalised yet; sources of knowledge
2) Knowledge: Internalised and subjectified information via a person's cognitive decision process; knowledge is transferable to information when

the person shares his/her knowledge to others in written or verbal language (i.e., externalisation of internalised knowledge)

As the definition of knowledge focuses and stresses an individual's processing of information, this research denies the existence of absolute knowledge and rather, accepts the existence of relative knowledge. Hence, this finding accords with the constructivist's belief of learning discussed in Chapter Two that learning is relative to the individual. Many available definitions of information and knowledge in existing literature rely on abstract reasoning with philosophical and theoretical references, but the definitions generated in this research are based on empirical research data and thus the definitions provide more substantive and practical understanding of the two words.

As shown in Figure 14, nursing students' knowledge building process consisted of three steps: connecting with information, deciding to accept information, and building knowledge. As part of the decision-making process included in the definition of knowledge, this research introduced five motivational factors that influence the nursing students' decisions. Following this, the four stages of knowledge were identified. Within the motivational factors and the stages of knowledge, this research ascertained the cultural characteristics of nursing students who were affected by Confucianism culture. They tended to be more motivated by extrinsic factors of learning and are more inclined to build knowledge via memorisation. Although these factors may be associated with ineffective learning, Biggs and Watkins (1996) and Kember (1996) argued that students could develop deep learning with extrinsic motivation and build higher knowledge based on the memorisation.

As above, this research attempted to explore the nursing students' knowledge building

process within the context of the nursing education, defining the students' cognitive learning dynamics. Similar research on cognitive learning has been conducted in other academic fields such as education, information science, knowledge management and philosophy, but such research is limited in nursing education fields. Moreover, undergraduate nursing education is unique in the inclusion other subjects such as humanities and natural science. By defining the dynamics of cognitive learning within the context of nursing education, the findings of this research provides nursing educators with relevant and practical models that can be used to improve nursing curricula for future nursing students.

7.3. Knowledge building dynamics in clinical environments in the context of nursing education

7.3.1. Nursing education in clinical environments

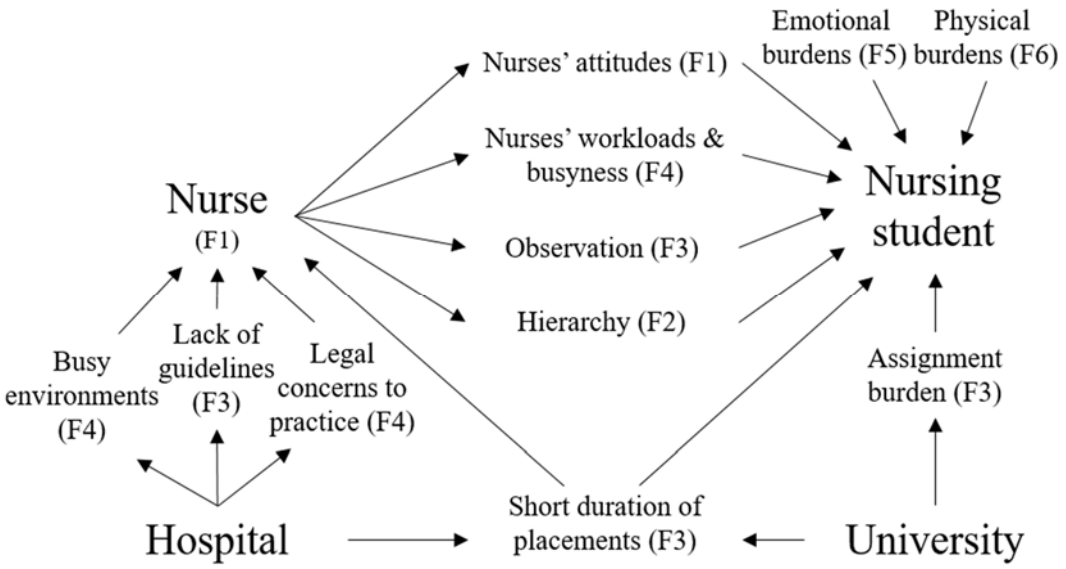
Based on the knowledge building process, this research explored nursing students' education in three learning environments, focusing in particular on clinical environments.

One of the main goals of nursing education is to nurture nursing students' clinical competencies by building appropriate nursing knowledge, skills and attitudes in dealing with the needs of patients (Yang, 2012). Therefore, clinical placement education is essential and irreplaceable for nurturing those competencies. In nursing literature, there is a general consensus regarding the significance of clinical placement education (Dunn & Hansford, 1997; Levett-Jones *et al.*, 2007; Park *et al.*, 2014).

However, many thorny issues of clinical placement education have also arisen, such as a lack of continuity between clinical and classroom education, students' feelings of vulnerability in clinical environments and less positive interpersonal relationships between students and nurses (Clarke *et al.*, 2003; Levett-Jones *et al.*, 2007). This research attempted to explore the nursing students' clinical learning dynamics in addressing nursing education issues, particularly those arising from clinical placement education.

This research attempted to categorise components that influence students' learning in clinical environments into six factors: interpersonal, socio-cultural, instructional, environmental, emotional and physical factors. Although the classification into six factors would be useful to define the factors that exist within the clinical learning environments, it is too rigid and insufficient to explain the '*dynamics*' of the students' learning in clinical placements. This is because instead of each factor working separately, all six factors collectively and complexly influence the students' learning. Thus, it would be worth restructuring the six factors that influence nursing students' learning into main concepts of the learning dynamics in the clinical environment. The interpersonal relationships between nursing students and nurses are located at the centre of the dynamics and these relationships are influenced by organisational components (i.e., hospitals and universities) as shown in Figure 16.

Figure 16. Dynamics of nursing students' learning during clinical placements



Note: F1-6 = F1: interpersonal factors, F2: socio-cultural factors, F3: instructional factors, F4: environmental factors, F5: emotional factors and F6: physical factors.

7.3.1.1. Organisational dynamics in nursing education

Firstly, the relationship between nurses and hospitals for the students' education will be explored. The students in this research disclosed that there was a lack of students' clinical education guidelines for the nurses, and the nurses who participated in this research also acknowledged the lack of guidelines from their hospital (*Lack of guideline: F3 Instructional factors*). Similarly, Kown and Seo (2012) reported that nursing students in Korea hoped that nurses would have standardised internal guidelines to abide by so as to deliver systematic education during clinical placements. Another research study surveyed 116 hospitals in Korea and found that only 61.1% of the hospitals had internal regulations regarding the students' clinical placements (Song & Kim, 2013). The lack of clinical education guidelines within Korean hospitals is due

to a lack of legislation or lack of guidelines at a national level that can compel hospitals to offer systematic nursing clinical education (Song & Kim, 2013), which contrasts with regulated education for nurses in the USA (Board of Registered Nursing, 2010) and the UK (Nursing and Midwifery Council, 2008).

There was another source of legal concern for nursing students. The students who participated in this research believed that their practice during placements could be limited due to legal regulations in Korea (*Legal concerns: F4 Environmental factors*). There are several articles of the Medical Service Act related to nursing students' medical activities in Korea. According to the Korea Enforcement Rule of Medical Service Act. Art 19 (2015), nursing students are allowed to engage in medical activities under the supervision of supervisors for their clinical placements. However, the definitions of 'medical activities' and 'supervisors' are ambiguous. Moreover, according to the Korea Medical Service Act. Art 21 (2009), it is prohibited for medical personnel (including nurses) and other health professionals to show or provide a patient's medical records, which include nursing records, to other persons. Although there are exceptional cases that are mentioned in the Act, nursing students' concessions are not stated. However, nursing students can usually access patients' medical records during the placements. As above, there is a lack of preparation by hospitals and debatable legal concerns in relation to nursing clinical placement education in Korea. Additionally, these concerns present further issues of patients' safety and rights of both students and nurses, thus causing the students difficulty in learning in clinical environments, as well as causing hospitals difficulty in teaching the students. Therefore, nursing educators and policymakers should tackle these concerns to

improve nursing education for future students.

Furthermore, another issue for the students' education exists between the nurses and hospitals – the nurses' heavy workloads and busyness (*Busy environments: F4 Environmental factors*). In this research, nurses and nursing students' asserted that clinical environments were unpredictable and dynamic, and nurses were too busy to educate the students due to their high workloads. The dynamic and complex characteristics of clinical environments have been introduced by many researchers such as Papp *et al.* (2003), Midgley (2006) and Yamada and Ota (2012). These busy and dynamic environments often negatively influence the students' learning. Papp *et al.* (2003) asserted that the uncontrollable and unpredictable clinical contexts made it difficult for nurses to plan the students' learning. Meanwhile, Jeong (2013) conducted a national survey with 1254 hospitals in Korea and reported the average nurse-to-inpatient ratio to be 1:12.9. This ratio is higher than that of Western countries. In the USA, the state of California legislated the nurse-to-patient ratio staffing law in 2004 and this law specified that one nurse is to care for a maximum of six patients (Lin & Liang, 2007). In the UK, a national survey in England reported the ratio as 1:8 during daytime and 1:10.8 at night (Ball *et al.*, 2012). Although the ratio in England is lower than that of Korea, the survey reported that 76% of nurses in England stated that there was insufficient staffing, 86% experienced a lack of time to finish their work on time, and 42% of nurses suffered emotional and physical burn-out (Ball *et al.*, 2012). From this evidence, it can be deduced that Korean nurses are, in fact, in poorer positions than their Western counterparts to support the students' clinical education due to the work overload, which results in their busyness.

As clinical education was based in hospitals, rather than in universities, universities did not exert a particularly strong impact on the students' learning dynamics. However, this research found that the students felt a burden to do the case report assigned by their university during placements (*Assignment burden: F3 Instructional factors*). A research study conducted by Mirzaei *et al.* (2012) identified that all their nursing student participants struggled with a heavy academic workload. Shaban *et al.* (2012) also asserted that nursing students complained of their assignment burden during clinical placements and that it caused them emotional stress, much similar to the findings of the research reported in this thesis. Emotional burdens will be dealt with later in this section.

7.3.1.2. Interpersonal dynamics in nursing education

Based on the influences by the organisational issues, the interpersonal relationship between nurses and nursing students was discovered as a key dynamic of the nursing students' clinical placement education. In Chapter Five, this research identified under the interpersonal factors that nurses who engaged in clinical placement education were the most influential people, as compared to the university lecturers and patients. This finding is supported by many nursing research studies that dealt with the topic of clinical placement education in nursing studies. Dunn and Hansford (1997) and Clarke *et al.* (2003) identified that interpersonal relationships with nurses significantly influenced nursing students' learning in clinical environments and this finding was internationally consistent in nursing research. More recently, many researchers such as Warne *et al.* (2010), Williamson *et al.* (2011) and Yamada and Ota (2012)

emphasised that the supervisory relationship between students and nurses was a key factor in promoting students' learning in clinical environments. Although the above researchers have stressed the importance of relationships, many studies have also identified both the nurses' and nursing students' difficulties in constructing positive educational relationships as supervisor and student.

This research found that the nurses' diverse attitudes towards the nursing students' education caused difficulty in building a positive relationship (*Nurses' attitudes: F1 Interpersonal factors*). This finding is supported by Hutchings and Sanders (2001). They contended that the students should be equally and consistently educated during clinical placements. Williamson *et al.* (2011) and Taniyama *et al.* (2012) also pointed out difficulties that nursing students experienced due to the inconsistency of nurses' attitudes. These concerns can be said to be fundamentally caused by the '*Lack of guideline: F3 Instructional factors*', as discussed above. If nurses do not fully understand or do not even have clinical education guidelines provided to them by the hospitals or universities, they will experience difficulties in providing systematic and consistent education to the students. They will also feel less compelled to commit time and effort to the students' clinical education.

Moreover, research from several countries reported on the burdens shouldered by nurses in educating nursing students in clinical environments (*Nurses' workload & busyness: F4 Environmental factors*). Dragon (2009) emphasised that nurses in Australia had difficulty in providing clinical education to the students due to their increased workload and patients' demands of high quality nursing care. Jokelainen *et al.* (2011) conducted a comparison study of nursing students' clinical placement

mentorship between the UK and Finland. They also found that nurses in both countries were struggling to secure protected time to educate students. Furthermore, a study conducted in the USA discovered that nurses felt the burden of working with students (Grindel *et al.*, 2003). Due to the difficulties experienced by the nurses in supporting the nursing students' clinical education, the students accordingly experienced difficulty in building close interpersonal relationships with the nurses. However, Williamson *et al.* (2011) emphasised that positive interpersonal relationships between students and nurses resulted in the students' positive learning outcomes. This international concern in nursing studies is not different to the situation in Korea. Many studies conducted in Korea discussed that nurses had neither capability nor sufficient time to support the students' learning, as they are too busy from their heavy workloads (Shin, 2000; Hur *et al.*, 2004; Yang, 2012). A nursing student in another recent Korean study also said "*I don't think nurses care much about us because they are too busy. They don't pay attention to what we are doing; they just do what they need to do*" (Kim & Oh, 2015, p. 111). These findings closely correspond with the findings from this research. In this research, nursing students asserted that education was their priority, but nurses did not have the capacity to support them due to their busyness from heavy workloads. As above, the nurses' heavy workload was discussed in the organisational relationship between the nurses and hospitals (i.e., *Busy environments: F4 Environmental factors*). This condition forms the basis of the nurses' experienced difficulty in educating the nursing students, along with completing their own duties and constructing positive interpersonal relationships with the students.

Busyness also influenced the nurses' instructional method: observation (*Observation:*

F3 Instructional factors). Clinical placements in this research were mainly observation-based, rather than practice-based. As the nurses are busy dealing with their own work and do not have enough time to teach the students, learning through observation is one of the realistic alternatives for students to experience the clinical environment as well as nursing practice. Kim *et al.* (2012) also reported that observation was a familiar and often-used instructional method during clinical placements. Moreover, the legal concerns of students' practice in clinical environments, which was discussed in the organisational components above, influenced the instructional method. Indeed, Kim *et al.* (2012) and Hur *et al.* (2013) indicated that this situation was caused by considering the nursing shortage for student education and patients' safety and rights in the complex clinical environments. In such situations, nursing student would experience greater difficulties in cultivating their nursing practice competencies (Hur *et al.*, 2013).

This research has highlighted that the socio-cultural factors, which are rarely considered in nursing research as an educational factor, have a significant impact on the students' clinical education, and underlies the interpersonal dynamics in the clinical environment. One particular factor is social hierarchy (*Hierarchy: F2 Socio-cultural factors*). In Chapter Four, Five and Six which present the findings of this research and the above discussion of the knowledge building process, this research frequently discussed the Korean students' collectivistic characteristics in Confucianism culture. Namely, these characteristics were deeply embedded in their learning dynamics. Collectivism stresses the importance of membership in a society and seeks the values of harmony, solicitude and yielding when interacting with others, whereas

individualism focuses on the individual entity, emphasising its uniqueness (Triandis, 1995). Thus, people in collectivist cultures pursue communal goals by trying to fit into society, while in contrast, people in individualist cultures seek individual goals. Although every society has both individualism and collectivism, the society is characterised by one predominant paradigm (Gudykunst *et al.*, 1988; Gudykunst *et al.*, 1996; Heo *et al.*, 2012). East Asian countries such as Korea, China and Japan share traditions of Confucian thought in their cultures and these countries are regarded as collectivism dominant countries (Lee, Geistfeld*, et al.*, 2007). In national contexts, Hofstede and Bond (1988, p. 8) contended that Confucianism teaches "*the stability of society is based on unequal relationships between people*" as a key principle. Indeed, as a vital socio-cultural factor, the participants in this research also stressed the existence of social hierarchy in both social and learning contexts, especially in clinical environments (they expressed the hierarchy using Korean words '*gab*' and '*eul*') and they disclosed that this hierarchy negatively influenced their learning.

Although limited studies are available, several Korean studies dealt with the nursing students' lower hierarchical position and the discipline expected of them in clinical environments. Shin (2000) discussed the difficulties students had with expressing opinions to nurses due to their lower positions, especially with regards to the nurses' mistakes, as influenced by Confucian teachings. Similarly, noting that this was something deeply rooted in the Korean educational system, Yang (2012) identified the students' difficulties during clinical placements due to the hierarchical relationship with nurses. As the students accepted the Confucian culture that insists on obeying social hierarchy, the study expressed the nursing students' difficulty as "*not being able*

to make a noise even to breathe… During lunch, one can sit and make noises" (Yang, 2012, p.133). Moreover, Yang (2012) continued to contend that this cultural context postponed the students' engagement in the clinical environments, which supports the findings of this research.

Meanwhile, this hierarchical relationship between nurses and nursing students can also be found in research conducted in Western countries where Confucian culture is not dominant. An Australian nursing study asserted that sometimes nursing students experienced restrictions to their learning due to organisational hierarchy and ritual in clinical environments (Dunn & Hansford, 1997), and Flinkman *et al.* (2013) argued that a hierarchy exists in the Finnish hospitals and that nursing students were at the bottom of that hierarchy. The students also expressed their powerlessness to change that hierarchy (Flinkman *et al.*, 2013). From this evidence, it can be assumed that a hierarchical structure would exist within nursing in hospitals all round the world. However, it could be said that in East Asia (e.g. Korea), the hierarchy would be amplified by the influence of Confucian culture. Therefore, stricter rules and reinforcement of the hierarchy could be applied to the East Asian students and it could pose a huge obstacle that interrupts their learning in clinical environments. Following the hierarchy, school ties in Korean students' learning in clinical environments were discussed in this research. It can also be connected to the collectivist culture in Korea. As this culture emphasises the interrelationships within a group (Triandis, 1995), school ties would also count as valued relationships. Through school ties, nursing students and nurses feel a strong sense of belongingness with each other and based on this, nurses in superior hierarchical positions would treat those affiliated students more

favourably in the learning context. However, there is a lack of research on the concept of school ties, despite the influence on nursing students' clinical education. Therefore, more research would be required.

Nursing students' clinical education was affected by the duration of each clinical placement, and that duration was decided by mutual agreements between hospitals and universities (*Short duration of placements: F3 Instructional factors*). Many researchers such as Dragon (2009), Warne *et al.* (2010) and Ali *et al.* (2011) found that a longer placement duration was beneficial for building positive interpersonal relationships between nursing students and nurses as the longer duration:

1) offered the students' better understandings of the nurses' role,
2) provided more opportunities to learn, and thus
3) promoted the students' overall satisfaction.

Moreover, longer placements also helped students build better therapeutic relationships with patients (Warne *et al.*, 2010). Interestingly, Levett-Jones *et al.* (2008) conducted a comparison study between Australia and the UK on the duration of clinical placements and also found that students in the UK who were offered longer placements had more positive attitudes toward their learning in clinical environments as they had higher sense of belongingness than the students in Australia. This indicates that during a longer placement, students have more time and opportunities to build a higher sense of belongingness, resulting in more positive clinical placement experiences.

The students in this research discussed the importance of rapport for their learning in

clinical environments and expressed their difficulties building rapport with the nurses within the short placement duration. The concept of rapport in this research is similar to Levett-Jones *et al.*'s (2008) concept of belongingness in the interpersonal relationship between nurses and the students. Levett-Jones *et al.* (2008, p. 9) defined belongingness as "*A deeply personal and contextually mediated experience that evolves in response to the degree to which an individual feels (a) secure, accepted, included, valued and respected by a defined group, (b) connected with or integral to the group, and (c) that their professional and/or personal values are in harmony with those of the group*". According to the Oxford Dictionary Online (2015), rapport was defined as "*A close and harmonious relationship in which the people or groups concerned understand each other's feelings or ideas and communicate well*". More precisely, based on the two definitions, it can be interpreted that the concept of rapport is a necessary condition to the concept of belongingness. In other words, if students do not establish a close relationship with the nurses where they can communicate and understand each other well, the students will feel less secure, accepted, and valued. Feeling distant from the nurses (i.e., without building rapport), the harmony between the students' and nurses' is disrupted, reducing the students' overall sense of belongingness. Meanwhile, as above, collectivism values one's membership in society, the communal goals of society (Triandis, 1995) and stresses belonging to society (Hofstede, 1983). Thus, the students in collectivism-dominant Korea would seek a sense of belongingness within the nursing society at clinical placement sites and would attempt to obtain this by building rapport with nurses (i.e., the belongingness can refer to socially-formed personal needs via rapport). The nursing students in this research, however, experienced failure in building rapport with nurses due to the short placement

durations, and the students accordingly failed to construct a sense of belongingness. Levett-Jones *et al.* (2008) explained that such failure to construct a sense of belongingness can cause negative clinical experiences.

As was mentioned in Chapter Five, Korean nursing students would usually be rotated to new clinical placement sites every one or two weeks. This rotation interval is much shorter than that of a university in the UK where nursing students usually undertake clinical placements from four to twelve weeks at a single site (Levett-Jones *et al.*, 2008). Nursing students in the UK are required to complete 2,300 hours of practice curricula, and this constitutes half of all required nursing curricula hours to be awarded with qualifications to practice (Nursing and Midwifery Council, 2010). In contrast, in the case of 'A' university where I recruited participants in Korea, nursing students' had to earn 27 academic credits with 1,125 hours of practice curricula, and 108 credits for theory-based curricula to graduate (i.e., the practice component of the curriculum is 20%). The required practice hours of the Korean university is less than half of the required hours stipulated in the UK regulations. However, in comparison to the Australian university introduced in Levett-Jones *et al*.'s (2008) comparative study, the required clinical placement practice hours in Korea is more, as the nursing students from the Australian university conducted around 800 hours of clinical placement and rotated every one to two weeks, as in Korea. From the comparison between the three countries, there is an indication that the total stipulated hours for clinical practice curricula in each nursing programme might be the rationale for the duration of placements. In cases like the UK, when there are a lot of hours in the curriculum allotted to clinical education, each placement can then be of a longer duration. The

opposite is then true in both Australia and Korea, where total practice curricula hours are significantly less, resulting in placements of a similar duration in both countries. Therefore, when reflecting on this research's findings in consideration of Levett-Jones *et al.*'s (2008) comparative research between the UK and Australia, it can be concluded that Korean nursing students would have more difficulty in building a strong sense of belongingness, similar to the students in the Australian university, due to the lack of practice hours and short term rotation, than in comparison with the UK.

In response to the negative placement experiences that result from a lower sense of belongingness, researchers have recommended scheduling the duration of clinical placements for longer periods of time: Levett-Jones *et al.* (2008) recommended no less than four weeks, Dragon (2009) suggested three or four weeks, and Warne *et al.* (2010) implied over three weeks. Thus, nursing educators in Korea should consider changing the current placement durations to longer than three weeks at each site.

However, a longer clinical placement does not guarantee positive interpersonal relationships between nurses and nursing students, nor does it guarantee the students' positive learning experiences. Even with longer clinical placements, if the quality of clinical education or the quality of interpersonal relationships is not ensured, nursing students could still have clinical experience that do not optimise their learning. Despite the UK having been discussed as an exemplary case, some concerns about the nursing clinical education in the UK have been raised. For example, Randle (2003) identified that many nursing students in the UK had experienced bullying from the nurses during placements due to hierarchy in the nursing society and these experiences negatively influenced their learning. Brammer (2008) emphasised that the quality of interpersonal

relationships with nurses has a great impact on the students' learning experience during clinical placements. As was introduced in this research, the interpersonal relationship is directly affected by several factors, such as the nurses' attitudes, their workload and busyness, and the hierarchy. Therefore, these factors should be carefully addressed to ensure the quality of interpersonal relationships during longer clinical placements.

Meanwhile, this research identified that the students' burdens influenced by the hierarchy and the lack of belongingness were reduced in university environments (i.e., classroom and SBL environments). This is because they were familiar to the environments and believed they had a higher level of rapport with lectures. This condition accordingly reduced their emotional burdens and the influence of the nunchi mechanism in the university environments.

7.3.1.3. Individual dynamics: Emotional and physical influences on nursing clinical education

In clinical environments, the students became stressed by various negative emotions due to the negative influence of all the extrinsic factors (*Emotional burdens: F5 Emotional factors*). These students' negative emotions were mostly caused by the interpersonal dynamics with the nurses. This research also discussed that these emotions significantly hindered their learning. In the literature, many research studies on nursing clinical education reported that the students struggled with their emotional stress in clinical environments due to various reasons, such as heavy assignment loads (Deary *et al.*, 2003; Shaban *et al.*, 2012), unfamiliar surroundings (Yang, 2012), their

low social positions (Randle, 2003), and relationships with nurses (Cahill, 1996). In particular, Cahill (1996) discussed that the students received more negative stress from their relationships with the nurses than from their workloads. Melincavage (2011) and Shaban *et al.* (2012) also found that nursing students suffered emotional distress due to their relationships with nurses. This emotional distress should be carefully managed in the clinical learning environment. This is because learning and overall academic performance can be negatively affected when a learner's concentration, memory, and problem-solving abilities are disrupted by high levels of stress and anxiety (Beddoe & Murphy, 2004). Moreover, Begley and White (2003) argued that as nursing students' emotional distress increases, their self-esteem decreases. Levett-Jones *et al.* (2007) discussed the interconnection between self-esteem and belongingness (e.g., belongingness can increase self-esteem). Poor interpersonal relationships with nurses lead to a diminished sense of belongingness, reducing the students' self-esteem, and become a source of emotional distress that results in a disturbance to the students' learning during the clinical placement.

Meanwhile, the students in this research believed themselves to be emotional labourers. Smith (1992, 2012) reported that similar to nurses, students too, encountered emotional labour. She brought the definition of emotional labour from Hochschild (2003, p. 7):

> "*This labour requires one to induce or suppress feeling in order to sustain the outward countenance that produces the proper state of mind in others-in this case, the sense of being cared for in a convivial and safe place*".

In a recent Korean study, Kang (2015) investigated the nursing students' level of

emotional labour in clinical environments using a questionnaire, based on a study by Morris and Feldman (1996). Although she also reported that the students were emotional labourers, she did not clearly demonstrate the source of the nursing students' emotional labours (Kang, 2015). The source of the students' emotional labours could be from either the relationship with patients or the relationship with nurses, but it was assumed that the source was solely from the student-patient relationships, disregarding the influence of nurses during their clinical placements. In Smith's (2012) study, while addressing the nurse-student relationship and the impact of hierarchy on the students' emotions, the concept of emotional labour was based primarily on the relationship nurses and nursing students had with patients. However, the emotional labour that students in this research experienced was found to be based more on the students' own emotional distress due to their hierarchical relationships with nurses and having to adjust frequently to unfamiliar surroundings for each new clinical placement. Additionally, the students felt substantial emotional burdens from having to utilise the nunchi mechanism in clinical environments for their learning. Namely, the students' emotional labour mainly involved their own relationships with the nurses, and not with the patients. While the students would also conduct emotional labour in their relationships with patients during placements, the strong emotional impact of negotiating hierarchical relationships within the clinical context emerged more significantly in this research. This can be linked back to the collectivist Korean context, and the emphasis on maintaining hierarchical social order in Confucianism. As Smith (1992, 2012) found in both her first and second study, in the 1980s and 2000s respectively, nursing students' rapport with the nurses was essential for giving the students a sense of security and belongingness, which would impact on their learning.

As hierarchy and authority can instil emotions of fear and anxiety (Smith, 2012), the Korean students in this research experienced greater emotional labours in attempting to build rapport with the nurses. In an attempt to do so for their learning, students in this research employed the nunchi mechanism, suppressing their negative feelings by outwardly expressing positive attitudes, so as to not offend the nurses or challenge their authority.

Although it was not as significant as the emotional burdens, nursing students in this research experienced physical burdens from the placements. This was due to having to change their lifestyle to adjust to shift work and adjust to clinical environments. Yang (2012) also addressed the difficulties nursing students experienced due to physical burdens, reporting that the students had to stand during their duty feeling as if they were being punished, making their legs sore, and would only be able to sit during lunchtime. In addition, Lindop (1999) discussed the students' physical burdens due to hard work during clinical placements.

In this research, the students further asserted that they experienced greater difficulty with their emotional burdens rather than their physical ones, and that their emotional burdens increased their physical burdens. Although the relationship between emotional and physical burdens has not arisen as a major topic of this research, it would be useful to investigate this relationship in further research as these factors show an interconnection between them and influence the students' learning in clinical environments.

7.3.2. Nursing students' negotiation of clinical learning dynamics

Hitherto, the dynamics of the six influential factors on nursing students' clinical placement education have been explored. The nursing students showed their responses to these dynamics, which have been categorised as such: 1) conforming to the condition in clinical environment, 2) using nunchi mechanism and 3) undertaking self-directed learning. Through these responses, they negotiate with above three dynamics (i.e., organisational, interpersonal, and individual dynamics) in order to maintain their learning in clinical environments.

7.3.2.1. Conforming to the condition of clinical environment

Notwithstanding that clinical environments are unfriendly towards them, the students understood and conformed to the conditions of those environments as this was unavoidable. Moreover they continuously sought to learn within those environments while respecting the nurses. That is to say the students rationalised to themselves that conforming to the conditions of those environments and adjusting to the unpredictable nurses' behaviours are their natural duties as students. Therefore, they attempted to fulfil these duties so as to be accepted by the nurses. This closely corresponds with the findings of research by Levett-Jones and Lathlean (2009, p.348) who found nursing students' conforming to the nurses' group during placements "*as a means of improving their chance of inclusion and, by contrast, a way of reducing their risk of rejection*", connecting the students' attitude to the desire of belonging to the group (Levett-Jones & Lathlean, 2009). Moreover, the students in this research also believed that adopting

this attitude, a response of silence to the conditions of the clinical environment, would increase their chances of building rapport with the nurses so that they can belong to the nursing group. This corresponds to the compensation received for conforming, as identified by Gray and Smith (1999, p. 642), "*the increased likelihood of a good placement; feeling part of the team and like a nurse; pleasing their mentor; receiving a good practical assessment; and reducing stigma*".

Interestingly, Levett-Jones and Lathlean's (2009) study recruited a Korean nursing student who studied in Australia, but the study lacked consideration of cultural factors. Coopamah and Khan (2011) stressed that the conformity in countries influenced by Confucianism and collectivism originated from the deference to seniors. In Chapter Five, this research identified that the students were respectful of and considerate to the nurses and their busyness, although they were unable to learn properly. Therefore, in comparison to Western learners, Korean students will tend to conform more strictly to the clinical contexts, seeking harmony with and belongingness to the nurses' group by obeying social norms rather than challenging them.

7.3.2.2. Using nunchi mechanism

Cultural background is one of the crucial indicators in understanding one's behaviour (Kim, 2003). Nunchi is one of the most frequently cited words for the description of Korean culture in the literature (Yi & Jezewski, 2000; Kim, 2003; Lee, 2012) and is a vital concept for Korean culture (Kim, 2003). Although nunchi is the crucial social mechanism in the Korean context, this concept has been very rarely addressed in

academic literature, especially in nursing fields.

This research discovered that the nunchi mechanism was fundamentally founded on the social hierarchy of interpersonal relationships. The person in the lower social position would utilise the mechanism in order to study the person in a higher social position. The nursing students attempted to analyse the atmosphere of the clinical environments and the nurses' behaviour by studying nunchi, and then based on the analysis, decided on appropriate responses to the situation. Kim (2003) also believed nunchi was a competency and a communication technique to interpret other people's attitudes, feelings, wants and intentions when interacting with them or the atmosphere of the place of interaction. The nunchi competency and technique do not rely only on verbal communication, but also a study of the contexts. Lee (2012, p.185) also emphasised that nunchi is "*like a sixth sense, but it is more looking at visual clues and understanding what the person is really saying*".

Words that are semantically similar to nunchi exists in both Chinese and Japanese cultures (e.g., Chinese: '**看眼色**' and Japanese: '**空**をよむ') (Heo *et al.*, 2012), which lead some researchers to believe that studying others' nunchi is a socio-cultural characteristic of East Asian countries, dissimilar to Western countries (Rhee *et al.*, 1995; Yi & Jezewski, 2000; Heo *et al.*, 2012). These researchers attempt to explain this cultural difference by using the concept of low and high context culture. According to Hall (1989), culture can be explained by the context of communication. In low context culture, people tend to deliver direct and clear verbal messages while communicating with others, whereas people in high context culture mostly use indirect, implicit and non-verbal communication. Gudykunst *et al.* (1988) contended that low

context culture was strongly connected to individualism, while high context culture was linked to collectivism. As collectivism values harmony, solicitude and yielding, people in collectivist cultures make efforts to not offend or disregard, but to be considerate of others' feelings. Thus, they tend to use indirect expressions rather than direct ones during communication with others and, at the same time, rather than relying on only verbal contents, they tend to study non-verbal signs such as verbal tone, attitudes and environment (i.e., indirect and nonverbal communication) (Heo *et al.*, 2012). Thus, nursing students in a collectivist and high context-dominated culture used the nunchi mechanism in order to study both clinical contexts and nurses in order to fulfil collectivism values.

The nunchi mechanism can also be referred to as intuitive reasoning. Westcott (1968, p. 8) defined intuition as "*the process of reaching accurate conclusions on the basis of consensually inadequate information*" and Gerrity (1987, p. 65) believed intuition is "*a perception of possibilities, meanings, and relationships by way of insight… Intuition permits perception beyond what is visible to the senses, including possible future events*". These definitions have similar properties to the definition of nunchi (see *5.2.3.2. Using nunchi mechanism*). Although intuitive reasoning is also observed in Western literature, East Asians are more oriented to the reasoning than Westerners due to different cultural backgrounds (Buchtel & Norenzayan, 2008). Moreover, Norenzayan *et al.* (2002) argued that different style of reasoning exists between East Asians and European Americans. They insisted that East Asians were more oriented to intuitive reasoning that is "*experience-based, resists decontextualizing or separating form from content, relies on sense experience and concrete instances, and*

overlooks rules and logic when they are at odds with intuition" (p. 678), whereas European Americans were more likely to use formal reasoning that is "*rule-based, emphasizes logical inference, represents concepts by necessary and sufficient features, and overlooks sense experience when it conflicts with rules or logic*" (Norenzayan *et al.*, 2002, p.678). Therefore, the students in this research relied strongly on their intuition, which is based on their experience, to make their decisions about behaviour in consideration of the contexts in clinical environments. Hence, the nunchi mechanism can also be referred to intuitive reasoning as they both share common properties. However, as Mitchell (1994, p. 2) asserted, intuition is "*a universal human experience*" and much Western nursing research such as Rew (2000), Green (2012) and Pearson (2013) explored the concept of intuition, so intuition should not be regarded as an exclusively Asian concept.

This research also discovered that the students' nunchi mechanism was correlated to 1) the level of rapport with nurses, 2) the students' active or passive attitudes towards their clinical placements, and 3) students' confidence. Each of the three components constructs mutual and sequential influential relationships with nunchi. For example, if students possess active attitudes and study nurses' nunchi successfully, their rapport with the nurses will increase, reinforcing their confidence and active attitudes. In turn, increased rapport, confidence and active attitude diminish the negative influences of nunchi. As a result, the student can learn more comfortably in clinical environments. However, most nursing students in this research struggled with the negative aspects of nunchi and received insufficient education during clinical placements. In addition, the negative nunchi mechanism brought substantial emotional burdens to the nursing

students, which accordingly caused the students' difficulty in building rapport, reducing their sense of belongingness during clinical placements. Kim (2003) argued that sometimes there could be misjudgements, as nunchi is not an objective mechanism but one's subjective interpretation. Norenzayan *et al.* (2002) also stressed that East Asians who relied on intuitive resonance had more inaccurate responses than the European Americans who used formal reasoning. If students incorrectly interpret a context and the nurses' intentions through the nunchi mechanism and act on that misinterpretation (i.e., poor communication with the nurse), they may be criticised by the nurses or make a critical mistake while attempting to build a relationship with the nurses. Indeed, this often happened during the students' clinical placement, as discussed in Chapter Five. This misinterpretation or negative nunchi mechanism would be caused by their immaturity and reduced social competency.

- Nursing students' professional socialisation

Clinical environments are substantially distinct from university or home environments (Shin, 2000). As most Korean students enter university directly after completing their secondary school course, they do not usually experience many social interactions outside of school and home. The clinical environment, as a place of work, is definitely unfamiliar to the students. Leaving the secure and supportive environment of university, they have to learn how to adapt to the work culture and negotiate human relationships in clinical environments (Yang, 2012; Arieli *et al.*, 2015). Namely, the clinical environment is the place where students have a chance to acquaint themselves to the real-life nursing profession (Dunn *et al.*, 2000; Arieli *et al.*, 2015). Therefore,

the students' social competencies can be insufficient during clinical placements as they are still novices in the real working world. However Hathorn *et al.* (2009) emphasised that the conditions of clinical environments (e.g., nurses' busyness and their heavy workload) could cause students' negative socialisation. Moreover, Hardy and Conway (1988) and Cope *et al.* (2000) insisted that the students required acceptance from the nurses for them to begin socialising as a nursing professional. This once again confirms the crucial role nurses play in the students' clinical learning experience, highlighting the interpersonal relationships between nurses and the students.

Notwithstanding that the nursing students in this research experienced difficulties at first, they disclosed that they learnt how to socialise within the environments as time went by. Many research studies also reported that nursing students commonly experienced difficulties in adjusting to the clinical environments, resulting in high levels of emotional distress during the initial period of clinical placements (Sharif & Masoumi, 2005; Jimenez *et al.*, 2010; Yang, 2012). However, Sharif and Masoumi (2005) and Yang (2012) reported that this emotional distress diminished over the course of time. Therefore, longer durations of clinical placements as discussed previously would also be helpful to the students' socialisation in the environments.

7.3.2.3. Undertaking self-directed learning

Knowles (1975, p. 18) defined self-directed learning as "*a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning,*

choosing and implementing appropriate learning strategies, and evaluating learning outcomes".

This research found that in the busy clinical environments, students received less education from the nurses than they felt met their learning needs. Students responded to the dynamics of the clinical environments by undertaking self-directed learning, autonomously attempting to design and conduct their own learning plans during clinical placements. While it was mostly found to be a necessary response to the conditions of the clinical environment, the students who had also discussed active learning positively had more positive clinical learning experiences than those who were less active. Similarly, Papp *et al.* (2003) reported that nursing students themselves believed that they should be mainly responsible for maximising their own learning in clinical environments, no matter if they had teaching support or not.

Loyens *et al.* (2008) asserted that a learner's personal motivation, particularly the learner's intrinsic motivation, plays an important role in pursuing self-directed learning. The decision to conduct self-directed learning is therefore related to the students' motivation. This research also explored learner's motivation in Chapter Four and in the above discussion (i.e., five motivational factors in the deciding process). This research discussed earlier that when the students had stronger and multiple motivations, they could build higher stages of knowledge (see *4.3.3. Building knowledge*). Although Loyens *et al.* (2008) contended that the learners' intrinsic motivations were vital for self-directed learning, it should be reemphasised that extrinsic motivation is also crucial for Korean students due to their immersion in a collectivist culture. Therefore, extrinsic motivation would be also be largely engaged

in deciding to conduct self-directed learning. However, as previously mentioned, the learning process was not conducive for the students in clinical environments due to the restriction in their activities, and consequently they could not effectively learn using self-directed learning.

Nonetheless, they attempted to conduct self-directed learning in their own ways, such as watching for learning opportunities to be educated using the nunchi mechanism, investigating nursing information themselves and reflecting their prior knowledge during observation of nurses. Papp *et al.* (2003) explained the characteristics of self-directed students as those who know what they are able or unable to do, while maintaining an attitude of actively taking responsibility for their own learning. Likewise, the students in this research demonstrated their ability to conduct self-directed learning by overcoming the limitations and barriers to their learning within the clinical setting, utilising a variety of strategies.

In clinical environments, if nurses cannot afford to educate the students due to their overwhelming workloads, the nurses should create and support a more conducive environment for the students to conduct self-directed learning. Moreover, university lecturers should consider developing instructional methods that nurture the nursing students' competencies in undertaking self-directed learning, and encourage them to implement that learning in clinical environments.

Hitherto, the dynamics of nursing students' learning in clinical environments and the students' responses to the dynamics were discussed with a review of academic literature. Following this, the students' learning in the context of nursing education in Korea will be discussed to gain a holistic view.

7.3.3. Experience and nursing education

This research explored the 'learning experience' of nursing students in three environments and then the experience in each environment was examined and compared.

Dewey stressed the importance of experience in the learning process as he contended that "*the idea that there is an intimate and necessary relation between the processes of actual experience and education*" (Dewey, 1938, p 20) and "*an ounce of experience is better than a ton of theory simply because it is only in experience that any theory has vital and verifiable significance*" (Dewey, 1916, p.183). According to Dewey (1916), the nature of experience in learning consists of the combination of 'trying' as an active component, and 'undergoing' as a passive component. In other words, it is a continuous cycle of doing and its consequence. This concept of Dewey's 'learning by doing' is widely known in education fields. This concept is a familiar one to East Asian cultures influenced by Confucianism, as Confucius also said "*I hear and I forget. I see and I remember. I do and I understand*" (Childs & Sepples, 2006, p.155).

It may seem like Dewey's concept refers to the learner's direct experience only, as the word of 'doing' specifies. However, Dewey's meaning of 'doing' does not only present the direct experience, but rather it encompasses both direct and indirect experience. In particular, he discussed that indirect experience comprises of most of our learning experiences and continued to argue that the limited scope of direct experiences in our life "*as we have seen, the scope of personal, vitally direct experience is very limited. If it were not for the intervention of agencies for representing absent and distant affairs, our experience would remain almost on the level of that of the brutes*" (Dewey, 1916,

p.222). This indirect experience includes the experience of reading and listening from others' experience (e.g., classroom education via lecture). Hence, Dewey (1916) called this indirect experience 'mediated experience', in comparison with direct experience. He acknowledged the importance of this mediated experience (Dewey, 1916), and agreed that mediated experience (termed 'non-live experience' in this research) via language and symbols was useful to accumulate, acquire, and reproduce information for knowledge building. At the same time, however, he also believed indirect experience was slow and that overdependence on the indirect experience from reading and listening could hinder learners' educational development. For this reason, he emphasised the importance of 'realising sense' that was "*used to express the urgency, warmth, and intimacy of a direct experience*" (Dewey, 1916, p.223). Moreover, Dewey (1916) discussed that education should focus on assisting learners to cultivate good habits of thinking, rather than simply infusing information into the mind, and to develop their abilities of adopting information as their own and applying it.

The aforementioned ideas of Dewey not only support the findings of this research, but also serve as a meaningful consideration for nursing education. As discussed in Chapter Five, this research divided the nursing students' learning experience into non-live and live experience, with non-live experience referring to the classroom experience, and live experience referring to both experiences of SBL and clinical placements. Dewey's definition of indirect experience refers to non-live experience in this research, as this research believes that reading and listening are also learning experiences (see Table 30).

Table 30. Comparison between Dewey's terms of experience in this research

Terms in this research			Dewey's terms
Non-live experience		(Classroom learning)	Indirect experience
Live experience	Direct experience	(Simulation-based learning)	Direct experience
	Indirect experience	(Clinical placement learning)	Direct observation

In the non-live learning experience, this research identified how nursing students learned in classrooms via the following learning process: passively receiving nursing information → building nursing knowledge → evaluating the knowledge. In this process of learning, the students learned passively from the university lecturers and mainly used the memorisation method. As discussed before, the memorisation method is an East Asian's process to understand the received information (Kember, 1996). Similar to Dewey's emphasis, this research also discovered that nursing students acknowledged the importance of classroom learning (i.e., non-live experience), as they could acquire a large volume of nursing information and accumulate their knowledge (i.e., memorisation and understanding) so that they can utilise it in clinical contexts as base knowledge.

Although learning from non-live experience is important, in light of Dewey's educational paradigm, learning with live experience is arguably central in education. This is especially so with nursing education, for which the goal is to help students become competent in practicing nursing in real clinical contexts (Yang, 2012). Moreover, a student in this research reported that nursing students could have "*sense of reality*" (Hwashin, Nursing student), as highlighted by Dewey above (he used the term 'realising sense') as an important factor of learning experience, in clinical environments. However, the dichotomous thinking between live and non-live

experience should be prevented. Instead, the combination of both should be considered in the learning process. Dewey (1916) stressed that indirect experience needs to be connected with direct experience in genuine contexts. Nursing studies conducted by Papp *et al.* (2003) and Tiwari *et al.* (2005) also stressed the connection between knowledge from indirect experiences (i.e., theoretical education in classroom) and knowledge from direct experiences (i.e., practical education). Hence, it will be ideal if nursing students are given many chances to apply their knowledge from indirect experiences to real clinical environments via direct experience. In addition it is expected from this process that they can reinforce prior knowledge and develop new knowledge.

Meanwhile, this research discussed that 'applying' was a relatively higher stage of knowledge (third stage knowledge) than memorisation and understanding in the four stages of knowledge introduced in Chapter Four. The 'applying' can be connected with Dewey's concept of direct experience as direct experience fosters the development of 'applying' knowledge. Namely, direct experience encourages the learner to reach the higher stage of knowledge than knowledge of memorisation and understanding, which can be connected to indirect experience. At this point, it is useful to identify the relationship between knowledge and experience in this research as we are discussing learning experience. Simply put, knowledge is built by experience to recognise information. Experience, here, provides a vehicle to connect with information. During this cognition of information that exists external to the self, one decides whether to accept it or not as discussed in Chapter Four.

However, in the clinical environments, the students had difficulties in developing their

knowledge from the memorisation and/or understanding stages via non-live experience, to the applying stage. This is due to the restrictions the students face in undertaking practice during clinical placements. Hence, they mainly conducted observations of the nurses' practice. Dewey (1916) called this as direct observation. He regarded the observation as vivid and crucial, but he believed "*it has its limitations; and in any case it is a necessary part of education that one should acquire the ability to supplement the narrowness of his immediately personal experiences by utilizing the experiences of others*" (Dewey, 1916, p.151). Although the observation is live experience, this research divided live experience into direct and indirect experience, and observation during clinical placements was included as indirect experience (see above Table 30) as I believed the direct experience accompanied more 'active' body actions.

7.3.4. Simulation-based learning

Simulation based learning (SBL) has been adopted in nursing education in response to the limited opportunities for direct experience during clinical placements (Rauen, 2004; Rhodes & Curran, 2005) as this instructional strategy also provides nursing students with direct experience.

Based on the findings in Chapter Five, SBL was defined as:

An instructional strategy, based on clinical scenarios that is artificially designed by the educator, to train learners' clinical practice and decision-making competencies using ICT-guided patient simulators in a realistic mock clinical environment. During SBL,

the learners 1) have opportunities to repeatedly apply their prior knowledge via direct experience, 2) play a leading role in their nursing practice (i.e., self-directed learning), 3) cooperate with other learners to co-construct collective knowledge and 4) reflect on their own performance. Through this learning, the learners are expected to develop clinical competencies and to have confidence performing clinical practice in real clinical contexts.

The SBL characterised in this research share much in common with nursing literature such as Jeffries (2005), Cant and Cooper (2010) and Shepherd *et al.* (2010) that dealt with SBL. Especially, Jeffries (2005, p. 97) also defined simulations as "*activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through techniques such as role playing and the use of devises such as interactive videos or mannequins*". Due to the rapid development of ICT, ICT-guided devices for SBL are popularly used in nursing education (Moule, 2011). Many Korean universities have also adopted high-fidelity interactive manikins as they have been found to provide better educational outcomes than that of low-fidelity devices (Issenberg *et al.*, 2005), and all of the students who participated in this research experienced these manikins. This instructional method of using simulation offers various advantages in healthcare education that regards clinical education as a critical part of the curricula and these advantages have been introduced in many academic programmes.

Firstly, nursing students have opportunities to repeatedly apply their knowledge during SBL and thus overcome the lack of practice opportunities during clinical placements (Decker *et al.*, 2008; Prescott & Garside, 2009; Cant & Cooper, 2010; Hope *et al.*,

2011; Roh *et al.*, 2013). In Dewey's perspective that we discussed above, this connection from non-live experience to direct experience in live experience is beneficial to the learner's education. Secondly, students can actively participate in the SBL process in comparison with classroom learning, where students learn passively (Jensen *et al.*, 2009; Hope *et al.*, 2011). Moreover, with active attitudes, students are more able to conduct self-directed learning during SBL (Jeffries, 2005), in contrast to during clinical placements. Thirdly, SBL facilitates students to use critical thinking and hones their decision-making skills (Jensen *et al.*, 2009; Cant & Cooper, 2010) during active participation and self-directed learning. Fourthly, it allows them to receive feedback on their simulation performance from the lecturers, and thus can undergo reflective learning (Lasater, 2007; Moule, 2011; Roh *et al.*, 2013). Lastly, the students are able to develop confidence in their practice and learning, based on above advantages (Cant & Cooper, 2010; Hope *et al.*, 2011; Moule, 2011).

These advantages of SBL correspond with the characteristics of ConLT that was discussed in Chapter Two. As the ConLT considers the learners' individualised experience and learning contexts as significant, and additionally supports a learner-centred, active, reflective, collaborative and critical learning process, SBL would arguably be one of strong instructional strategies that corresponds with a contemporary learning paradigm (i.e., ConLT).

Moreover, SBL supports learners to reach the 'applying' and 'synthesising' stages of knowledge that were discussed in Chapter Four. This is because the learners are required to apply existing knowledge to their performance in the simulation context, and to synthesise the knowledge gathered from indirect experience with that from

direct experience.

Although SBL seems like an ideal learning strategy to have direct learning experience in nursing education, the students who participated in this research pointed out its limitations. SBL attempts to provide students with a sense of reality when performing nursing practice, but ironically, the students failed to feel the realism with SBL, despite the high-fidelity simulator and the mock clinical environment. This is because they could not communicate with the simulator as they would with a real patient, and nursing skills practice was limited due to the dependence on the automated system. These findings were similar to the study conducted by Shepherd *et al.* (2010), and this research found that several other researchers agreed with the lack of realism with simulators and the mock environments (Jensen *et al.*, 2009; Moule, 2011; Roh *et al.*, 2013).

There is no doubt about the benefits of SBL in nursing education, but it would be risky if nursing educators believe in SBL as the ultimate alternative to clinical placements, due to issues of insufficient realism. As before, Dewey emphasised the importance of learning in real contexts. Although SBL can mimic the clinical environments, it would be impossible to reproduce its contexts in its totality and to learn professional socialisation during SBL. Namely, clinical environments are not replaceable in nursing education. Hope *et al.* (2011, p. 714) insisted that SBL "*may be considered by some as the 'second best' option for practice learning*". SBL is not a master key used to resolve all learning issues with clinical placements as an alternative form of instruction to clinical placements. Rather, SBL would have more effect on nursing educations as a supplementary instructional strategy, when clinical placement education is properly

conducted. Hence, it is required to enhance the conditions of clinical learning environments rather than heavily relying on SBL.

7.3.5. Reflection on prior knowledge and schema

Reflection on an individual's prior knowledge during the learning process was previously discussed, however how a learner's prior knowledge is stored in his/her mind has not yet been clearly defined in this research. As a learner's prior knowledge is personal and influences all stages of the knowledge building process, it is crucial for us to understand how that prior knowledge is stored in the learner's mind. The concept of 'schema' is thus adopted to explore this.

Bartlett (1995) introduced the concept of 'schema' (pl. schemata) in psychology in 1932 and defined the schema as "*an active organisation of past reactions, or of past experiences*" (p.201). Later, the schema has also been discussed and interpreted by several researchers such as Baddeley (1976), Anderson (1984), and Glaser (1984). Glaser (1984, p. 100) interpreted schema as "*a schema is conceived of as a modifiable information structure that represents generic concepts stored in memory. Schemata represent knowledge that we experience- interrelationships between objects, situations, events, and sequences of events that normally occur*".

Glaser (1984) described experience as the link between different types of information and a modifier of pre-existing knowledge structures. This forms an overlap with Dewey's (1916) concept regarding the nature of experience in the learning process – a cyclical process of 'doing' and its consequence, to provide significance to pre-existing

theory – whereby ‘doing’ links something new to the learner’s pre-existing knowledge, and consequently modifies the pre-existing knowledge the learner possesses. To sum up the above definitions and properties of schema, it can be deduced that schemata are the knowledge structures, which are built from one’s direct and indirect experience of interacting with the outside world and is stored in one’s mind. During interactions with the outside world, the schemata are updated, modified and developed in one’s mind. This variability of knowledge is supported by both the finding of knowledge definition in this research and the constructivist’s epistemological belief that denies the objective reality, but rather emphasises each individual’s personal knowledge constructed by the subjective reality, as discussed in Chapter Two. Meanwhile, the term ‘information’ used in Glaser’s definition of schema is equivalent to the term ‘knowledge’ as defined and used in this research (i.e., the information is already internalised and possessed in one’s mind: see Chapter Four).

Baddeley (1976) contended that (pre-existing) schemata forms the basis of one's learning when attempting something new. Within the nursing students’ knowledge building process in Chapter Four, schemata were also engaged in and influenced all three steps of knowledge building (i.e., connecting, deciding and building). For example, schemata can be the basis of the students’ intentionality to connect with recognised information. Moreover, schemata influence the students’ motivation to decide whether to accept certain information or not. In the four stages of knowledge development, each stage of knowledge is included in schemata (i.e., knowledge structure) per se as it is stored in one’s mind. In particular, the ‘applying’ and ‘synthesising’ stage of knowledge utilising schemata as sources for applying and

synthesising knowledge.

The schemata are utilised within each of the three learning environments in nursing education. For example, in the classroom environment, the students conduct their learning through a three-phase learning process. During the 'receiving' information and 'studying' processes, the students utilise the schemata in order to generate new knowledge as background knowledge. Moreover, the schemata that is utilised within one learning environment can be reflected and utilised in the other environments. For instance, a nursing student can reflect on the diabetes knowledge (i.e., a schema) acquired in a classroom environment during his/her observation of diabetes nursing care in clinical environments, and also utilise that acquired knowledge in a simulation scenario.

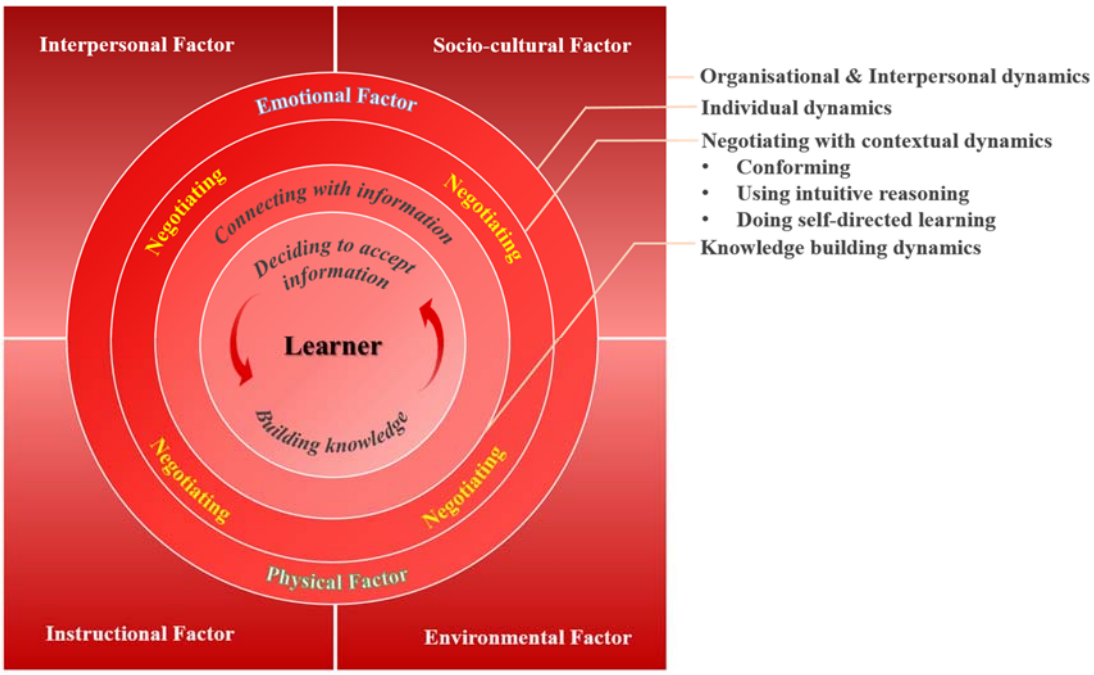
In summary, schemata are knowledge structures stored in the mind and form the basis for a learner's continuous interaction with the outside world, whether active or passive. During this interaction, the schemata are modified and continuously evolve, quantitatively and qualitatively. In particular, the existing knowledge in schemata can be developed into higher stages of knowledge. As individual learners' experiences vary, each individual possesses his/her own epistemological world and knowledge via schemata. As repeatedly discussed, nursing students need to continuously reflect on prior knowledge and to apply acquired theoretical knowledge from the classroom to nursing practice. Schemata are crucial for this application. However, research studies dealing with nursing students' dynamics of schema are rare. Thus, more in-depth research regarding schema in nursing education as a part of nursing informatics and/or nursing pedagogy is required. Moreover, schemata are also the outcomes of knowledge

that are built throughout nursing students' knowledge building process, discussed in Chapter Four. Hence, facilitating and supporting nursing students to sufficiently and properly build nursing knowledge would be a priority, so as to enrich their schemata. As Dahee, a nursing student who participated in this research, asserted in Chapter Five that "*I see as much as I know".* Lastly, nursing students in this research disclosed that they were restricted in active utilisation of their schemata due to the curriculum mismatch between the three environments in Chapter Five. Thus, nursing educators would be required to re-examine current nursing curricula and reduce the gaps between the three learning environments, or re-design the curricula to ensure continuity and transferability of teaching across all learning environments.

7.3.6. Theoretical model: Contextual Knowledge Building Dynamics Model (CKBD Model)

Guided by CGT, this research developed a theoretical framework based on the findings and discussion of this research, called the 'Contextual Knowledge Building Dynamics Model' (CKBD Model) (see Figure 17).

Figure 17. Theoretical model: Contextual Knowledge Building Dynamics Model (CKBD model)



This research identified four external factors (i.e., interpersonal, socio-cultural, instructional, and environmental factors). These factors include the organisational and interpersonal dynamics that influence nursing students' clinical education. These dynamics of external origin caused the students' internal emotional and physical factors. Each individual learner negotiated with the two external and internal factors as contextual conditions, in order to maintain their learning process. The negotiation played a role in linking the contextual conditions and individual subjective knowledge building process. How the individual negotiates with the conditions produces different learning outcomes. The negotiation included 1) conforming to the contextual conditions, 2) using intuitive reasoning, and 3) undertaking self-directed learning. The negotiating process can be linked with Dewey's (1916) concept of 'trying' and 'undergoing' (i.e., interaction with outside world) in the learning experience, as

discussed earlier. Through the negotiation, students were given opportunities to connect with information for knowledge building and these cognitive knowledge building dynamics were discussed above (see Figure 14: KBD model). These two theoretical models fit with the constructivist learning paradigm as they both share common characteristics such as a subjective knowledge building process, a learner-centred model, and a consideration of the learning context.

7.3.7. Conclusion of knowledge building process in clinical environments

One of objectives of this research was to explore nursing students' learning dynamics in clinical environments to develop a substantive theory. Through the research process, the CKBD Model was developed and discussed. Moreover, SBL and classroom learning were also demonstrated in order to provide a background to support a richer understanding of the dynamics.

The theoretical model offers an in-depth understanding of how nursing students' learning takes place, especially during clinical placements. Within the knowledge building dynamics models, this research identified the nursing students' more negatively-oriented knowledge building process in the clinical contexts. The clinical contexts as the external factors were not prepared for their education and the students received emotional and physical burdens due to the unprepared clinical contexts. Moreover, their negotiation with the contexts was mostly not successful due to their immature social competencies. As a result, their knowledge building was delayed and

they had difficulties nurturing their nursing practice competencies in clinical environments.

As their negative dynamics have been identified through this research, nursing educators and policymakers as well as nursing student should attempt to resolve the issues arising from these dynamics (see Chapter Eight).

7.4. Knowledge building dynamics using ICT in clinical environments

Based on earlier discussions, nursing students' learning with ICT in clinical environments will be discussed alongside academic literature.

As discussed in Chapter Two, ICT has made a great impact not only in clinical environments, but also in nursing practice, due to its added benefits to clinical practice (see Table 1). ICT allows information to be saved, gathered, acquired, and shared easily and quickly, therefore nursing students in this research were able to witness the advantages of using ICT in clinical environments, such as 1) increased ease and convenience of nursing work, 2) increased nursing work efficiency via time-saving and 3) improvement in quality of nursing care.

However, this research also discovered some disadvantages of using ICT in clinical environments. First of all, this research discovered that there were concerns of security and confidential information leaks. This finding corresponds with numerous research studies, with researchers Hughes (2003) and Lee (2007) having addressed the issue of

security and confidentiality with using ICT in healthcare fields. This disadvantage appears to be a common and chronic concern of using ICT in healthcare as well as in other fields. Although ICT experts have attempted to develop better ICT systems to curb this concern as ICT has advanced, the concern has instead been amplified. Thus, it seems unwise to solely rely on advancements in ICT to resolve all concerns regarding ICT. Rather, I believe that we should develop the users' (i.e., healthcare professionals) awareness of the concern using critical thinking, and to increase their ICT competencies to prevent themselves from becoming the cause for concern. Furthermore, despite the advantages of ICT in reducing nurses' workloads, as supported by Meyer (1992) and Simpson (2004), the students and nurses who participated in this research had different views; rather, they believed ICT increased the nurses' workloads. This finding is supported by Webster *et al.* (2003). They reported 32% of 582 nursing staff participants agreed that ICT increased their workloads, whereas 52% of the participants disagreed (Webster *et al.*, 2003). Although the majority disagreed, a considerable proportion of participants agreed, highlighting that increases to the nurses' workloads due to ICT should not be ignored. More recently, Gough *et al.* (2014) discussed that technology generated more nursing interventions as ICT enables nurses to monitor patients' conditions in detail. As another disadvantage of ICT in clinical environments, West (2003), Bond (2009) and Gough *et al.* (2014) argued that nurses spent more time interacting with computers than with patients. Namely, ICT reduced time spent with patients. This also supports the findings of nurses having reduced direct contact with patients in this research. Moreover, the participants indicated the nurses' overdependence on ICT in clinical environments. Campbell *et al.* (2007) identified clinicians' overreliance on ICT and highlighted that

there is limited research reporting health professionals' overdependence on automated ICT systems. In nursing fields, Buus-Frank (1999) suggested that nurses should avoid an overdependence on technology so that they can effectively integrate technology into their nursing practice.

A relationship between the aforementioned disadvantages of ICT can be deduced. The utilisation of ICT in the clinical environments augments the nurses' ICT-related workloads, and accordingly, their reliance on ICT for nursing practice. This increased reliance would cause nurses to deviate from their direct contact and nursing care with patients. However, this relationship between the disadvantages of ICT was not investigated in depth in this research, or in other nursing studies. Hence, it would be worthy to explore the relationship in further research to understand the use of ICT in nursing practice and the resulting quality of nursing care patients receive.

Aside from the advantages and disadvantages of using ICT in clinical environments, this research mainly explored the nursing students' ICT use during clinical placements as the aim and objective of this research indicated in Chapter One. As this research identified from both qualitative and quantitative research, nursing students had been exposed to ICT throughout their lives and mainly used ICT to manage and process information in the home, university and clinical environments. In Chapter Four, this research discussed that 'connecting with information' was one of the key processes to build knowledge. Thus, ICT can support students to build knowledge as it offers more chances to connect with information (i.e. variety of software and hardware, portable and non-portable) and facilitate nursing knowledge building. In particular, nursing students attempted to connect with information via ICT during clinical placements for

their knowledge building. Ward and Moule (2007) also discussed that nursing students used ICT to search for nursing information during clinical placements for their own knowledge and to support patients. Therefore, it may be useful to foster supportive clinical contexts in which nursing students are educated in how to use clinical ICT and are encouraged to use the ICT.

However, as previously discussed, this research found that students had difficulties in learning in clinical environments due to the six influential factors. The nursing students' use of ICT in clinical environments is necessarily affected by the learning dynamics in clinical environments. Thus, the understanding of clinical learning dynamics is essential in exploring the nursing students' use of ICT during clinical placement education. Indeed this research discovered that the learning dynamics discussed in Chapter Five offered a richer understanding of their use of ICT in the environments. As demonstrated in Chapter Six, the nursing students were also limited in their learning via the use of ICT during clinical placements, despite its benefits for their knowledge building. The difficulties nursing students in this research experienced correspond with many other nursing research studies that explored nursing students' use of ICT in clinical environments (Ward & Moule, 2007; Farrell & Rose, 2008; Scott *et al.*, 2008; Bond, 2009; Fetter, 2009b). This research identified the factors influencing nursing students' educational use of ICT and the factors can be explained through two dynamics: organisational (i.e., hospitals and universities) and interpersonal dynamics between nurses and nursing students.

7.4.1. Organisational dynamics in nursing students' use of ICT

As part of the organisational dynamics, this research found that the clinical environments are not prepared to facilitate nursing students' use of ICT. Nursing students struggled with finding available ICT devices, especially computers, due to the limited number of ICT devices. Amongst ICT in clinical environments, students primarily used EMR via computers. The major users of the EMR are the nurses because they form the largest group in healthcare fields and because of the nature of their clinical work (e.g., nursing records, medication, and communication with other health professionals (Top & Gider, 2012; Kowitlawakul *et al.*, 2013). Thus, students were mostly required to learn and practice using the EMR so as to experience one of the nurses' work tasks, as well as to obtain clinical information for their knowledge building as the EMR enables them to connect with vital clinical information. Top and Gider (2012, p. 1979) simply defined EMR as "*a computerised record of clinical, demographic and management information*". Thus, nurses can generate and read information related to patients as well as conduct nursing management through a computerised system. Moreover, they can communicate and share the information with other healthcare professionals using the EMR. Many studies reported the advantages of using EMR such as improvement of quality of care (Murphy, 2010; Yee *et al.*, 2012; Kowitlawakul *et al.*, 2013), cost-effectiveness (Murphy, 2010; Yee *et al.*, 2012), efficient documentation of healthcare records (Murphy, 2010; Yee *et al.*, 2012), increased accessibility of healthcare records (Top & Gider, 2012) and effective clinical information processing (Kowitlawakul *et al.*, 2013). Amongst these, effective clinical information processing would be the key advantage of EMR as it allows for the other

advantages. The key advantage also influences nursing students' learning in clinical environments because they can obtain clinical information for knowledge building via the EMR. In Korea, many hospitals have increasingly adopted hospital information systems including the EMR. According to Chae *et al.* (2011), the computerised provider order entry and EMR adoption rates in all 44 tertiary hospitals were 97.6% and 21.4% respectively in 2005, but the adoption rate increased by 100% and 77.3% respectively in 2010, thanks to the rapid development of ICT systems in Korea. All the nursing students who participated in this research experienced using the EMR in either the tertiary or other lower level hospitals. Meanwhile, there are some nursing studies exploring nursing students' use of EMR as part of pre-registration training to build competency in documentation for future employment (Mahon *et al.*, 2010; Baillie *et al.*, 2013; Kowitlawakul *et al.*, 2013), but there is a lack of research regarding nursing students' use of EMR for nursing knowledge building. Out of all the aforementioned advantages of the EMR, nursing students who participated in this research mainly took advantage of the usefulness of obtaining clinical information via the EMR for their learning. As nursing students can connect with the clinical information they want through the EMR, they can understand what is happening in the clinical environments and conduct self-directed learning. Moreover, although they are restricted in performing nursing practice during the placements, they can have live-indirect experiences of the nurse's role and nursing practice via the EMR in genuine clinical environments. The EMR therefore helps nursing students gain vivid experiences and practical clinical information, which differs from the non-live experiences in classrooms, allowing a reduction in the gap between theory and practice. As a result, nursing students would be able to build better knowledge in clinical environments.

However, as there was a lack of computers for nursing students to use, their use of the EMR was limited in the clinical environment. This reduced availability of computers for nursing students' use was also reported by Guillot and Pryor (2007) and Willmer (2007).

Another factor that restricts nursing students' use of the EMR is the concern about security. As there is a lack of educational guidelines for nursing students in hospitals and additional legal concerns over nursing students' access to patients' information, the nurses who participated in this research worried about the nursing students' EMR use. Similarly, Baillie *et al.* (2013) reported that nursing students experienced hesitation from the nurses with regards to nursing students' EMR access due to the confidentiality of patient information. Moreover, a study revealed that hospitals in which nursing students conducted clinical placements cited security of patient information as their biggest concern regarding nursing students' access to their ICT systems (Fetter, 2009a). Moreover, as most hospitals in Korea use different EMR systems from each other (Cho *et al.*, 2010), this research identified that nursing students had difficulties adjusting to new EMR systems every one to two weeks when they rotated placement sites. Thus they had insufficient opportunities to effectively learn and use the EMR at each hospital.

This research also indicated that the participating nursing students struggled with using ICT due to a lack of ICT education from both hospitals and university, especially for the EMR. In particular, the universities give them assignments that require them to use the EMR during clinical placements and the nurses also understand the need for nursing students to use the EMR, but neither universities nor nurses offer sufficient

EMR training to the nursing students. Rather, the nursing students can only receive formal EMR education when they become newly-employed nurses. Thus, nursing students in the quantitative research may have positive attitude towards training of ICT (i.e., demanding ICT training or education). This finding corresponds with Maag's (2006) research as the nursing students in her research believed ICT education was crucial. Farrell and Rose (2008) asserted in their research, in which they explored clinical nursing education with ICT, that adequate education would be vital to effectively implement innovation. Moreover, nurses as well as nursing students are expected to develop competency in informatics as a core competency of qualified nurses (Cronenwett *et al.*, 2007; Schleyer *et al.*, 2011). Therefore, nursing students should receive sufficient and appropriate education during their nursing programme to build their informatics competencies, and this education should take place in both university and clinical environments. General ICT training and nursing informatics education (particularly EMR education) received only in university environments can be insufficient because it would be impossible to reproduce every complex and unique clinical ICT hardware and software in university environments due to space or funding. Ip *et al.* (2007) asserted that nursing students' informatics skills acquired in university may or may not be transferable in clinical environments. More importantly, they highlighted that it would be desirable to have a chance to practice the skills as part of clinical nursing education. This aspect can be connected to Dewey's recommendation as discussed earlier, namely having direct experience in real environments. Ornes and Gassert (2007) also argued that nursing education in universities allowed nursing students to experience informatics but did not allow them to experience technologies in the clinical environments. Thus, nursing informatics education in the clinical

environment would be essential to allow nursing students to develop and practice their informatics skills in real clinical environments, so as to achieve informatics competency.

In fact, many nursing students in Korea have already used the EMR during clinical placements without sufficient education. Many hospitals in Korea maintain distance from the nursing students' education and access to the EMR during clinical placements, leaving it to the charge and/or staff nurses' discretion without providing any guidelines or policies for nursing student use. However, it has been discussed that the nurses cannot afford to educate nursing students sufficiently due to the influential factors discussed in Chapter Five, particularly due to their busyness in busy clinical environments. Therefore, hospitals would need to establish clear guidelines for nursing students' ICT and/or EMR education, as well as show leadership in allowing them to use it for their learning (Fetter, 2009a). By committing to doing so, hospitals would be ultimately investing in potential nursing employees, as well as the organisation itself. The quality of nursing can be increased while the burden of cost in training new nurses can be reduced. Meanwhile, nursing schools should educate their nursing students to have fundamental informatics competency and ethical literacy in dealing with patients' confidential information. This will ensure that nursing students will be ready to receive education in the hospitals, and will reduce the hospitals' concerns of patient data protection. Thus, it is recommended for universities and hospitals to cooperate in developing nursing students' informatics competencies (Ornes & Gassert, 2007; Fetter, 2009a; Fetter, 2009b).

7.4.2. Interpersonal dynamics in nursing students' use of ICT

Following the organisational dynamics, interpersonal dynamics between the nurses and the nursing students were identified as the factor influencing the nursing students' ICT use. This research has discussed that the interpersonal dynamics between nurses and nursing students are located at the centre of the students' learning. The nursing students' use of ICT is also affected by these dynamics.

As previously discussed, nurses are the main undertakers of the nursing students' education, including the use of ICT, in clinical environments. Moreover, nursing students have to receive permission from the nurses in order to use ICT in clinical environments. Thus the nursing students in this research reported that the nurses are accordingly the most influential people in their ICT use. Ward and Moule (2007) and Bond (2009) also highlighted that nursing students' access to ICT was affected by nurses' attitudes. Particularly, when they wanted to use EMR, receiving permission from the nurses was unavoidable, because they did not have the EMR login details. Rather, they had to ask the nurses to log into the EMR as a way of seeking permission. Likewise, Willmer (2007) reported the same condition for permission-seeking. However, seeking permission for access to ICT could be arduous for the nursing students. As part of the interpersonal dynamics, the nursing students in this research have to consider the social hierarchy, the nurses' busyness, and their attitudes towards nursing education to receive permission for ICT access. Namely, the social hierarchy and strong discipline within nursing groups interrupt the nursing students' ICT use.

This socio-cultural aspect in the use of ICT is rarely dealt with in nursing literature. The nursing students in the lower social position would experience difficulties in

asking and receiving permission from the nurses who are in higher positions. In addition, they are expected to maintain discipline in clinical environments and to show courteous attitudes. To maintain discipline, nursing students are discouraged from browsing the internet in clinical environments via ICT devices, such as hospital computers and their personal handheld devices. Instead, nursing students are expected to focus on using only the EMR, although ironically, there are difficulties even in using the EMR. More precisely, the nursing students were restricted from using their handheld ICT devices to retrieve information from the web during clinical placements. Due to their lack of access to computers and accordingly, the EMR, they are unable to obtain sufficient nursing information when they need it. This subsequently restricts their knowledge building process, as demonstrated in Chapter Four.

The use of nursing students' handheld ICT devices during clinical placements can actually be beneficial to access information required for knowledge building. Moreover, the nursing students favour using their familiar handheld ICT devices because of its convenience and high accessibility to information. In the literature, some nursing studies reported the advantages in use of personal handheld ICT devices such as smartphones and personal digital assistants (PDA). Similar to this research, it was reported that the handheld ICT devices offer rapid, immediate, efficient and accurate accessibility of necessary information to nursing students during clinical placements (Farrell & Rose, 2008; George *et al.*, 2010; Hudson & Buell, 2011; Phillippi & Wyatt, 2011; Johansson *et al.*, 2013). Information acquired via the handheld ICT devices can support nursing students' clinical reasoning (Kuiper, 2008), enabling them to conduct EBP. Moreover, as the nursing students are able to search for information that they are

interested in through their personal handheld ICT devices in a timely fashion during clinical placements, they are encouraged to conduct self-directed learning (Phillippi & Wyatt, 2011). Ward and Moule (2007) also emphasised that the handheld ICT devices could facilitate the nursing students' rapid communication with their university should they require any support during clinical placements, which could improve their learning and overall clinical experience. Based on above advantages of using personal devices, Johansson *et al.* (2013) and O'Connor and Andrews (2015) highlighted that the nursing students' use of personal handheld ICT devices could enhance their professional confidence during the placements.

Although the nursing students who participated in this research contended that ICT would decrease nurses' time with patients, Johansson *et al.* (2013) interestingly identified that Swedish nursing students believed their use of personal handheld ICT devices during placements could increase their time with patients due to its high accessibility, allowing nursing students to offer patient-requested information at the bedside. While these findings are promising, they also contradict the findings of this research. Therefore, prudence must be exercised if applied to a different socio-cultural context, as the clinical context and duties of both nursing student and nurse differ between both countries.

The advantages of undertaking self-directed learning through use of their personal handheld ICT devices can be expected to alleviate the nursing students' concerns of clinical nursing education discussed in Chapter Five, such as the lack of education from the nurses. However, due to the identified discipline within clinical environments, this would prove challenging in the context of this research. The discipline regarding

the use of personal handheld ICT devices during clinical environments is likely caused by social assumptions. Nursing students who participated in the research believed that they would be misunderstood as not taking their clinical education seriously, and the nurses who participated in this research admitted their inclination to question the nursing students' learning attitudes if seen using handheld ICT devices during the placements. Similarly, nursing student participants in Hudson and Buell's (2011) study also worried about being misjudged by nurses or patients if they were to use their handheld ICT devices in front of them. Furthermore, Phillippi and Wyatt (2011) expressed concern about the risk of breaching patient confidentiality and security when nursing students use such devices during clinical placements and store confidential clinical information in them – a concern that was not identified in this research. Additionally, although the handheld ICT devices can support nursing students' learning in clinical environments, they would still need to connect with nursing information in the EMR systems for their clinical education. In other words, it would be impossible to obtain all information they require via the handheld ICT devices.

Therefore, in order to reinforce the advantages and reduce the concerns of nursing students using their handheld ICT devices during clinical placements, nurses and the greater public need to understand the educational use of handheld ICT devices to reduce the negative assumptions surrounding it. Moreover, the cooperation between universities and hospitals is imperative to ensure the continuity and effectiveness of nursing students' education on appropriate handheld ICT device use in clinical environments, as well as EMR education.

Meanwhile, as an interpersonal dynamics in the nursing students' use of ICT, some

nursing research studies reported that nurses' insufficient ICT competencies could result in the nursing students' lack of education in ICT and its use (Scott *et al.*, 2008; Bond, 2009). However, this research did not identify this issue, although this research recruited four nurses. It may be because this research focused more on the nursing students' learning dynamics than on the nurses' teaching dynamic. Thus, a recommendation would be to explore the nurses' perspectives on clinical education and the dynamics of clinical teaching in Korea.

7.4.3. Emotional influences on nursing students' use of ICT

Many nursing researchers have reported on nursing students' emotional burdens during clinical placements, such as Cahill (1996), Randle (2003) and Shaban *et al.* (2012). However, few nursing research studies have linked the emotional burdens to their ICT use in clinical environments, although there are some studies that dealt with nurses' emotional burdens, such as their fear in, and of, using ICT (Miller *et al.*, 1997; Toofany, 2006).

The nursing students who participated in this research discussed their emotional burdens during clinical placements many times, especially with regards to the relationship with the nurses. This is a strong factor influencing their learning and thus this research concluded that nursing students did emotional labour. The nursing students also disclosed their emotional burdens in the use of ICT. These burdens are closely linked to the contexts of clinical nursing education, discussed in Chapter Five under the emotional factors. In other words, nursing students' use of ICT is based on

the learning dynamics in the clinical environments, and thus the emotional burdens due to the interpersonal dynamics with the nurses can cause their emotional distress in using ICT in clinical environments. Using the EMR is one of the few nursing practices that nursing students can undertake within clinical contexts, however they need to continuously consider many factors before and during the use of the EMR. These include their hierarchical position, the discipline and busyness of the clinical contexts, and having to study the nurses' nunchi to find appropriate opportunities to use the EMR. This process causes their emotional distress. In particular, nursing students felt stronger emotional burdens during ICT use due to the fear of making mistakes leading to medical errors or harm to patients. This emotional distress may be connected with the insufficient clinical ICT education from both hospitals and universities. Thus, the nursing students do not know how to use ICT in the clinical environments properly, resulting in a lack of confidence and increased anxiety as an emotional burden. George and Davidson (2005) asserted that the lack of preparedness in general and basic ICT use can cause anxiety when attempting to use new ICT. Thus, again, sufficient clinical ICT education for nursing students would be recommended to reduce the students' emotional burdens.

7.4.4. Nursing students' responses to the use of ICT during clinical placements

This research identified nursing students' responses to the above dynamics (i.e., their use of ICT in clinical environments).

The responses consist of three domains as ‘conforming to the condition of clinical environments in using ICT’, ‘using nunchi mechanism’ and ‘undertaking self-directed learning in using clinical ICT’. Due to lack of literature exploring nursing students’ ICT use in clinical environments, it would be useful to reflect their general responses to clinical nursing education, discussed in Chapter Five, on the use.

- Conforming to the condition of clinical environments in use of ICT

The nursing students are able to understand and conform to their limitations in using ICT during clinical placements. Furthermore, they conform to those conditions. Again, this attitude to conform to given social conditions is sought after in Confucianism-dominated countries to achieve harmony in their society. By conforming, they would expect to diminish the risk of being rejected by the society that they are currently involved in (Levett-Jones & Lathlean, 2009). At the same time, the nursing students would also expect to receive permission and opportunities to use clinical ICT through their efforts in conforming.

- Using nunchi mechanism

Nursing students also use the nunchi mechanism when they attempt to use ICT during clinical placements (e.g., EMR and the internet). By studying the nurses’ nunchi and analysing clinical contexts, they employ intuitive reasoning when finding opportunities to use ICT. However, this research discussed that they are in danger of misinterpreting the nurses’ nunchi as negative nunchi, which can cause more difficulties in using ICT, and increase their emotional burdens.

This research identified the vicious cycle of decreasing confidence levels through the

qualitative portion of this research. In other words, the negative nunchi mechanism in attempting to use ICT causes decreased ICT confidence, which is compounded by insufficient ICT education. The students' resulting fear of making mistakes with ICT use lowers their confidence even further while escalating their emotional distress. In the quantitative part of this research, nursing students also did not have high 'ICT Confidence' attitudes in comparison to the 'Care value of ICT' and 'Training of ICT skills' attitudes. This research concludes from these findings that the nursing students struggled with lack of ICT confidence, and their confidence seemed to play a vital role in using ICT. In academic literature, many researchers also emphasised students' confidence in the learning process. Nilsen (2009) discussed that a learner's confidence is a key factor for motivation in the learning process. Moreover, when using ICT, Gravill *et al.* (2002) believed that high levels of confidence enhanced learning outcomes and facilitated learners' self-directed learning. In the nursing field, Maag (2006) also reported that nursing students' motivations in using ICT was affected by their ICT competency and confidence, and that the lack of ICT education caused significantly lower confidence.

Due to the lack of healthcare research dealing with nunchi (as a form of intuitive reasoning), it is recommended to develop further nursing research exploring participants' experiences with nunchi when using ICT in clinical environments influenced by Confucianism culture. Moreover, research exploring nursing students' confidence in using clinical ICT is surprisingly scarce, affirming the need for further research inquiry.

- Undertaking self-directed learning in using clinical ICT

Without sufficient education of clinical ICT and encouragement to use ICT during clinical placements, it would be unreasonable to expect nursing students to be masters in using clinical ICT as soon as they become nurses. Although it would be inefficient, the nursing students attempt to learn and use the ICT on their own, particularly the EMR, during clinical placements. This is due to their curiosity of the clinical contexts and assignment obligations from their university. It can be called self-directed learning, but it should be noted that nursing students unwillingly conduct the learning, and actually wish to be educated more extensively by the nurses themselves. Alexander Pope, an English writer, once said, "*A little learning is a dangerous thing*" (Pope, 1711, p.14). Applied to this case, it raises our awareness that we should be concerned about nursing students' unsupported self-directed learning on how to use clinical ICT as it may cause more serious medical errors than not giving them opportunities and sufficient education to use the ICT.

7.4.5. Conclusion

Hitherto, nursing students' use of ICT in clinical environments has been discussed. ICT has rapidly changed the nature of clinical environments and it now has become an essential component of the environments, due to its advantages. However, this research identified some disadvantages of ICT in the clinical environments. Although the nursing students who participated in this research believed the advantages of ICT surpass its disadvantages, we should take care to not ignore the disadvantages and only

advocate the advantages. We would expect the use of ICT to increase the available time for direct nursing care, while ICT reduces nurses' workloads. However, as we can see from the disadvantages of ICT, the resulting decrease in time spent with patients and overreliance on ICT are not outcomes that are in line with the aims of the nursing profession. This implies a need for greater reform of nursing management, administration or policy that not only supports nurses' effective use of ICT to increase work efficiency, but to also increase time spent by the patients' bedside. In other words, a human-centred-perspective will be required in attempting to increase integration of ICT into nursing practice, rather than ICT-centred-perspective. In particular, one remedy to the current nursing situation that Korea should consider more seriously is a higher nurse-to-patient ratio.

In the aspect of nursing clinical education, the nursing students struggled with using ICT in clinical environments, despite having been exposed to ICT throughout their lives. As discussed above, the advantage of offering a large amount of information is one of the great merits of ICT. In clinical environments where nursing students would be able to acquire a large amount of nursing information via clinical ICT to build sufficient knowledge, there are several obstacles in the way. Nursing educators should aim to minimise or remove these barriers to using ICT in clinical environments to enhance nursing students' learning, rooting their strategies in ConLT. Beginning discussions of the best ways to support and encourage nursing students' uses of ICT (e.g. EMR, personal handheld devices) in clinical placements, while keeping in mind the socio-cultural background of the learners, would be one positive step forward for clinical nursing pedagogy in the current ICT era.

CHAPTER EIGHT: CONCLUSION OF THIS RESEARCH

8.1. Introduction

This chapter will conclude this thesis. To begin, a summary of this research will be demonstrated. Following that, strength, limitations of this research and recommendations for further research will be discussed. Lastly, the implications of this research will be considered.

8.2. Summary of this research

Based on literature reviews conducted due to my interests in the use of ICT in nursing fields, this research aimed to analyse the dynamics of undergraduate nursing students' learning and use of ICT during clinical placements. Four objectives of this research were established to accomplish the aim, as below:

- To explore nursing students' cognitive processing of information to build knowledge;
- To identify the dynamics of nursing students building nursing knowledge in clinical contexts;
- To evaluate and understand nursing students' attitudes toward the use of ICT in the clinical contexts and to demonstrate nursing students' use of ICT for their knowledge building in clinical contexts.

- To develop theoretical models demonstrating the learning dynamics in clinical environments, so that it can be used by various stakeholders involved in nursing and education.

This research adopted a qualitative-dominant mixed method strategy to analyse the dynamics of students' nursing knowledge building in clinical contexts, conducted in two phases. In the first, quantitative research phase, a cross-sectional study was conducted to understand nursing students' attitudes towards ICT. In the second, qualitative research phase, intensive interviews were conducted with a sub-sample of the same participating nursing students' regarding their methods and experiences of knowledge building, of which memos were then made.

The quantitative approach collected survey data from a total of 508 nursing students in Seoul, Korea from October 2012 to December 2012, and factor analysis and frequency analysis were adopted for analysing the data. For the qualitative approach, four rounds of individual and group intensive interviews were conducted with 16 nursing students, 4 qualified nurses, and 2 university lecturers from April 2013 to June 2015 (a total of 23 individual interviews and 6 group interviews) in Seoul. CGT was adopted to guide the qualitative approach, so as to allow exploration of individual experiences and identification of the relationship between individual and social contexts (Charmaz, 2006). Moreover, as the constructivist's paradigm in learning shares similar characteristics with the use of ICT for learning, I believed the theoretical concurrence of the research topic and methodology offered strong possibilities for consistent and rigorous findings.

The research findings were categorised into three domains and the scope of each

narrowed down from Chapter Four: knowledge building dynamics, to Chapter Five: knowledge building dynamics in clinical environments in the context of nursing education, and then to Chapter Six: knowledge building dynamics using ICT in clinical environments.

The first domain discussed nursing students' definitions of information and knowledge and their cognitive process of building knowledge from information. The process had three phases: connecting with information, deciding to accept information, and building knowledge. In the deciding phase, this research discovered five motivational factors that influenced this process, which were: 'learners' interest', 'necessity of information', 'volition to learn', 'utility of information', and 'frequency of information'. This research also identified the stages of built knowledge as: 'memorising', 'understanding', 'synthesising and applying', and 'creating'.

After this, nursing students' knowledge building dynamics in clinical environments were discussed based on the above domain. This research discovered that the dynamics were affected by six factors: interpersonal, socio-cultural, instructional, environmental, emotional and physical. This research also identified that the students conformed to the conditions of the clinical environment and responded to the factors by using the nunchi mechanism and undertaking self-directed learning. The students' learning dynamics in SBL and classroom education were also identified and were compared to the dynamics in clinical environments. From these findings, a process model of nursing students' learning during their nursing education in Korea was introduced (see Figure 10).

Lastly, as part of the quantitative research approach, nursing students' attitudes towards

ICT were identified using the shorted version of ITASH, for which validity and reliability were verified, along with their various uses of ICT. Based on the dynamics of learning in clinical environments and quantitative research results, the students' use of ICT in clinical environments was discussed through the qualitative approach. Five factors out of the six (interpersonal, socio-cultural, instructional, environmental and emotional factors) influenced the nursing students' use of ICT for learning in clinical environments, and they responded as they did for the above domain.

Across the three domains, it was evident that nursing students who participated in this research struggled with learning in clinical environments and accordingly, their use of ICT for knowledge building was therefore restricted in clinical environments. Moreover, this condition resulted in negative responses (such as negative nunchi).

In Chapter Seven, the findings of this research were discussed with existing literature and based on these, two theoretical models – knowledge building dynamics (KBD model) and contextual knowledge building dynamics (CKBD model) – were developed and introduced.

8.3. Strengths and limitations of this research, and recommendations for further research

Through the mixed method research strategy, I was able to collect rich research data and analyse the research topics multi-dimensionally. Moreover, this research assured reliability and validity in the quantitative research and the qualitative research was conducted rigorously and systematically according to CGT guidelines. The findings of

this research contribute to the body of knowledge on nursing education by expanding the understanding of nursing students' learning dynamics and their use of ICT in clinical environments, and by providing two theoretical models of the dynamics. Research fields that have been rarely dealt with in nursing, such as cognitive aspects of nursing knowledge building, were explored in this research.

However, this research has its methodological limitations, particularly issues of generalisation, discussed in *3.6. Limitation*. Although this research sought to reach a certain level of analytical generalisation due to the aim of constructing theoretical models (i.e., theory), this research recommended that further research related to the topics of this research, particularly those rarely dealt with in existing nursing studies, should be conducted to gain a more in-depth understanding of the findings. In particular, literature on learning dynamics influenced by socio-cultural factors is limited. As the factors deeply underlie the interpersonal dynamics between nurses, nursing students and the students' use of ICT in clinical environments, nursing researchers should have an interest in this research area. Moreover, due to its practical component, the nature of nursing education is unique to other educational fields. However, there is a lack of research studies that explore how nursing students learn and build nursing knowledge within the cognitive domain, especially during clinical education. Particularly, nursing students' uses of ICT for knowledge building is rarely dealt with in nursing research, although recognition of the importance of cognitive science is increasing in nursing informatics (i.e., see Chapter Two). Therefore, this research recommends that more research is conducted in these fields.

In relation to this research, it would be useful to reflect the research findings and

theoretical models against 1) other geographic areas across Korea or in other Asian countries and 2) other participant groups, such as medical students, to investigate transferability of the findings and models.

8.4. Implications of this research

Based on these findings and discussions, the following two sections will discuss the potential implications for policymakers, university lecturers, hospitals and nurses, and nursing students.

The findings of this research contribute to defining the issues that underlie nursing education in Korea and to the construction of theoretical models (i.e., KBD and CKBD) from these issues. In Chapter Two, this research discussed the benefits of adopting an appropriate learning theory that can improve instructional design. Through the introduced theoretical models and the body of literature explored, this research expects that there are numerous possibilities for enhancing nursing education. Therefore, it would be useful for policymakers and nursing educators to understand and consider the application of the theoretical models to nursing curricula design.

- **Policymakers**

  This research identified that due to the ambiguous legal statements in Korea, nursing students are concerned about undertaking clinical practice with real patients while nurses are concerned about offering those opportunities to students. Thus, policymakers should clearly and precisely determine nursing students' limitations of and allowances in opportunities for clinical practice

during placements through implementation of a medical or nursing education act, and support clinical education. This will allow nursing students to develop their clinical competencies and allow nurses to educate these nursing students without hesitation due to legal concerns.

- **University lecturers**

1) Firstly, for effective clinical learning education, university lecturers should support nursing students in developing the nursing competencies that are required in clinical environments, including clinical informatics and ethical competency. This effort would reduce the burden on hospitals (or nurses) to educate nursing students about these matters.

2) Through an understanding of the models, university lecturers should recognise that nursing students are strongly influenced by external factors and as a result, encounter many difficulties in undertaking effective clinical placements in clinical contexts. The educators are also recommended to examine and then improve their current nursing curricula in order to reduce nursing students' knowledge building burdens during clinical placements. For example, the lecturers can schedule theory-based diabetes education just before clinical placements in an endocrinology clinical ward. This link between classroom and clinical placement curriculum would facilitate synthesis and application of prior knowledge, obtained from the classroom, during placements and thus allow the students to construct a higher stage of knowledge.

3) Lecturers should notice when nursing students are struggling with emotional burdens such as anxiety and fear in remote and unfamiliar clinical

environments. Therefore, lecturers should come up with effective methods for supporting them to reduce their emotional burdens, such as providing teaching to fill any possible knowledge gaps, or counselling to improve interpersonal relationship management, stress management, or other personal issues. Due to the development of ICT, it would be useful to utilise ICT (e.g., smartphones) for communication between nursing student and lecturer.

4) Due to their underdeveloped social competencies, the nursing students are insufficiently prepared to socialise within the strange and unfamiliar clinical environments, and struggle to adjust. Therefore, university lecturers should recognise this and organise a course or support them to develop appropriate social competency before undertaking clinical placements. Moreover, the length of clinical placements at each site can influence nursing students' professional socialisation, as well as the rapport (or belongingness) built between nurses and nursing students. Therefore, this research recommends that lecturers should consider a redesign of the curriculum for clinical placements to last at least three weeks at each site.

- **Hospital and nurses**

1) As the most influential person during clinical placements and as a role model to nursing students, nurses should be aware of nursing students' underdeveloped social competencies and understand that the interpersonal dynamics have a great impact on the nursing students' learning. By doing so, nurses would be able to respect the nursing students' learning process during clinical placements and show a more positive attitude towards the nursing

students. Nurses are also recommended to involve the nursing students in the nurses' care plans for patients, with the perspective that the nursing students are their colleagues (or future colleagues).

Furthermore, this research discussed that the quality of clinical placement education is vital, along with longer clinical placements. Thus the nurses' support is essential. In particular, application of prior nursing knowledge by direct learning experience can encourage nursing students to construct a better quality of knowledge. Thus, if nurses foster clinical contexts that are conducive for the nursing students to gain more direct nursing experience, the nursing students' learning can be better supported.

2) Hospitals, which play their roles under the instructional and environmental factors, would be required to establish proper internal guidelines (or regulations) regarding nursing students' clinical education, so that the nurses can use them to offer consistent education to nursing students. Moreover, the hospitals would need to improve the nurses' busy working conditions in clinical environments, so as to allow the nurses to have more chances to engage in the nursing students' learning process. Namely, the hospitals are recommended to show their leadership to support the nursing students as their potential future nursing employees.

3) Hospitals and nurses should understand that ICT can help nursing students to obtain information needed for their knowledge building. For this, they are recommended to offer the nursing students clinical ICT education that is specific to their own organisation, particularly the EMR. Additionally, after

providing an orientation (e.g., data protection of patients), they should encourage the nursing students to use their personal handheld devices for their self-directed learning as well as knowledge building during clinical placements.

- **Collaboration between lecturers and nurses for clinical education**

  Lecturers mostly rely on nurses to deliver clinical education to the nursing students during placements, while nurses are unable to focus on providing that education during their work hours. However, the communication between the two parties seems insufficient. Hence, adequate communication is recommended for both lecturers and nurses to share their aim and vision regarding clinical education, and to discuss how to provide better clinical education delivery through collaboration and division of labour.

- **Nursing students**

  1) As this research identified, knowledge is an individual's property and knowledge building during clinical placements is affected by each nursing student's active (or passive) and positive (or negative) attitudes. Therefore, the nursing students should be aware of their own responsibilities in building knowledge and attempt to acquire sufficient clinical information via active and positive negotiating processes within the given contexts. Based on the acquired information, they should attempt to build nursing knowledge by leading the knowledge building process themselves (i.e., self-directed learning).

  2) Professional socialisation is also a learning process. The nursing students are

required to understand and respect the characteristics of the society they are members of, and then attempt to develop their social competencies in the nursing profession.

3) As future healthcare professionals, nursing students should make an effort to develop their informatics competencies with clinical ICT and ethical competencies by handling patient information so as to reduce risks of medical errors or confidentiality breaches.

8.5. Conclusion of this thesis

To qualify and practice as nurses in real clinical contexts, nursing students must be equipped with the necessary knowledge and practical skills to meet the competencies required of their profession. Rapid advancements in ICT and its continuous implementation in healthcare systems add to the list of competencies nursing students should be equipped with, so as to utilise ICT to provide high quality nursing care to patients.

The original aim of this research was to focus on nursing students' use of clinical ICT for their knowledge building. However, this research mainly focused on the students' cognitive knowledge building dynamics and on the dynamics within clinical environments, before discussing their use of clinical ICT for knowledge building. This was because, in light of the methodological benefits of CGT, I discovered that understanding the individual knowledge building dynamics as well as the dynamics within a specific environment preceded the use of ICT for knowledge building in that

environment. As such, the scope of topics gradually narrowed.

The findings and relevant literature review resulted in the construction of two theoretical models. These two models conceptualise the undergraduate nursing students' knowledge building dynamics with consideration for both intrinsic and extrinsic influences. Moreover, this research identified that the students' use of ICT during clinical placements was based on the knowledge building dynamics. The theoretical model of KBD model has offered a deep understanding of nursing students' cognitive knowledge building process using information as its source of knowledge. Based on this KBD model, clinical contexts of nursing education were further included, resulting in the CKBD model. The CKBD model facilitates a broad perspective of the nursing students' knowledge building process within the clinical context, and therefore underlies understanding nursing students' use of ICT for knowledge building in clinical environments.

Both models offer opportunities for application by various healthcare organisations, healthcare professionals, policymakers, educators, and nursing students themselves. The adoption and application of both models can not only improve nursing instructional design, but also assist in increasing the integration of ICT into nursing education, particularly clinical education. By doing so, nursing students' ICT competencies and confidence can be developed, so that they will be able to sufficiently cope when they enter the nursing workforce. Ultimately, the value of the findings of this research is expected to help fulfil the basic aims of nursing education, improve the nursing educational experience for the nursing students, and ensure quality nursing care provision to patients.

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APPENDICES

Appendix 1: Original Information Technology Attitude Scales for Health (ITASH), developed by Ward *et al*. (2006)

A. Efficiency of Care Scale (17 items)

1. Using computers is helping to improve patient/client care.
2. The sort of information I can get from the computer helps me give better care to patients.
3. Using computers makes my communication with other health professionals faster.
4. I worry that the use of computers in health care may undermine patient confidentiality.
5. I believe computers can help us deliver individualised care.
6. Using computers makes my communication with other health professionals less reliable.
7. Where I work, the software/computer programs/packages are easy to use.
8. The cost of the system would be better used employing more staff.
9. The time I spend with patients is reduced because of the time I spend at the computer.
10. I think we are in danger of letting computers take over.
11. Where I work, computers help to improve the way care is delivered throughout the organisation.
12. The speed with which I can access information on the computer helps me give better care to patients.
13. Time spent on computers is out of proportion to its benefits.
14. Use of electronic health records are more of a hindrance than a help to patient care.
15. I feel there are too many computers around now.
16. Where I work, computers make staff less productive.
17. Using a computer is more trouble than it's worth.

B. Education, Training and Development Scale (17 items)

18. I am satisfied with the amount of computer training I have received.
19. I have all the computer skills I need for my job.
20. It isn't worthwhile for health care professionals to acquire computer skills.
21. I can usually get help quickly when I need some advice about using a computer.
22. I would like to know more about computers.
23. I am satisfied with the level of computer training I have received.
24. I can't think of any benefits associated with using computers at work.
25. Using computers helps to increase professionals' knowledge base.
26. The computer training I have received has helped me to be efficient at work.
27. I would like to have on-going training to help me improve my computer skills.
28. Computer skills are becoming more and more necessary for health care professionals.
29. I feel I need more training to use the computers properly.
30. In order to be successful in my career I need to be able to work with computers.
31. I can usually get help quickly when I have a computer problem.
32. I am easily able to learn new computer skills.
33. The computer training provided by my organisation is poor.
34. The computer training I have received has helped me to use the computer efficiently.

C. Control (14 items)

35. I lack confidence in my computer skills.
36. There are enough printers for everyone to print what they need.
37. The computers where I work often break down.
38. I usually feel informed about changes that take place in my organisation.
39. I generally feel confident working with computers.
40. Computers make me feel stupid.
41. There are too few computer terminals available for the number of staff.

42. I’m often unsure what to do when using a computer.
43. When changes happen, my organisation copes well on the whole.
44. I only attend computer training because I have to.
45. At work I feel that my opinions are disregarded by the organisation.
46. I am able to choose when I use the computer at work.
47. I sometimes feel very intimidated by the thought of using a computer.
48. Where I work, the organisation provides adequate support for staff to use the computer system efficiently.

Appendix 2: Letter of permission to use and modify the ITASH from Mr. Rod award

Department of Nursing and Midwifery,
University of the West of England,
Glenside Campus,
Blackberry Hill
Bristol BS16 1DD

Jung Jae Lee,
20 Buccleuch Place,
Edinburgh EH8 9LN

24.4.14

Dear JungJae,

Further to our email discussions I am writing to agree your use and publication of the Information Technology Attitude Scale for Health (ITASH) scale.

As you know a report of this work was published as **Ward, R., Glogowska, M., Pollard, K. and Moule, P. (2009) Developing and testing attitude scales around IT.*Nurse Researcher*, 17 (1). pp. 77-87. ISSN 1351-5578.** Therefore the rights to the article text belong to the RCN Publishing Company. However the scale itself was first published by UWE in a report of 2006 – ISBN 978-1-86043-406-8

I have checked with our Head of Research Centre and UWE maintains the rights over the scale itself and therefore I am able to agree to its use and reproduction by Elsevier or another publisher for your paper.

Obviously we would appreciate a credit to the authors: Rod Ward, Margaret Glagowska, Katherine Pollard & Pam Moule with a statement saying "Used with the permission of the copyright holder, The University of the West of England, Bristol".

I hope this format is appropriate for your needs and if you require anything further please do not hesitate to get in touch.

Yours sincerely,

Rod Ward
RN, BSc, MA Ed, MPhil

ORIGINAL SOURCE INFORMATION
WORK TITLE/PRODUCT TITLE ITASH Scale
AUTHOR: Rod Ward, Margaret Glagowska, Katherine Pollard, Pam Moule
VOLUME/EDITION NO./OTHER:_ Project Report see http://eprints.uwe.ac.uk/4863/
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Name: Rod Ward Signature: Rod Ward Date: 24 April 2014

Company: University of the West of England, Briostol

Appendix 3.1: Modified Information Technology Attitude Scales for Health (ITASH) (English version)

University of Edinburgh
School of Health in Social Science

Nursing students' attitudes towards ICT

Researcher: Jung Jae Lee

Contact number: 07xxxxxxxxx

Contact email: xxxxxx@ed.ac.uk

Thank you for taking the time to complete this questionnaire

I am a second year PhD student in the School of Health in Social Science at University of Edinburgh. My supervisors are Professor Charlotte Clarke and Dr. Karen McKenzie. My research aims to construct a theory of learning about nursing students' dynamic when they use Information Communication Technology (ICT) in a clinical context.

As part of this research you are being invited to complete a questionnaire that explores nursing students' attitudes towards ICT. Please answer on the basis of your experiences of using ICT during your daily life and during clinical placement. The survey contains different sections and will take about 20 minutes to complete.

All of the information you provide will be anonymous. You will be asked to provide some information to allow us to match up the different parts of the survey, but no one will be able to identify you from this. There are no known benefits or risks for you in this study. Moreover, you may decide to stop being a part of the research study at any time without explanation. You have the right to ask that any data you have supplied up to that point to be withdrawn / destroyed.

This research has been approved by the research ethics committee in the School of Health in Social Science at University of Edinburgh.

If you have any questions or comments, or if you would like a copy of the results at the end of the study, you can contact my research supervisors, Professor Charlotte Clarke, at xxxxx@exseed.ed.ac.uk, and Doctor Karen McKenzie at xxxxx@staffmail.ed.ac.uk.

For each question, put a tick in the box you choose.

Example: Yes ☐ No ☑

Moreover, please use BLOCK CAPITALS when you answer

Thank you so much for your participation.

Information Technology Attitude Scales for Health

*This questionnaire has been adapted with permission from the authors (from Ward et al., 2006)

For the purposes of this questionnaire, the following apply:

- ICT devices include desktop computers, laptops, mobile devices (e.g. smartphone, PDA, tablet PC and slate PC) and medical technology devices.
- The term “at work” includes all kinds of clinical environments.
- The term “work and working” includes all kinds of nursing practices and placement.
- The term “staff” includes nursing students.
- The term “organisation” includes the hospitals and your university.

Part 1

Please response that best reflects how you would feel or experience

Please tick only one answer for each question	Strongly Agree	Agree	Disagree	Strongly Disagree
1. Using ICT devices is helping to improve patient/client care.	☐	☐	☐	☐
2. The sort of information I can get from the ICT devices helps me give better care to patients	☐	☐	☐	☐
3. Using ICT devices makes my communication with other health professionals faster.	☐	☐	☐	☐
4. I worry that the use of ICT devices in health care may undermine patient confidentiality.	☐	☐	☐	☐
5. I believe ICT devices can help us deliver individualised care.	☐	☐	☐	☐
6. Using ICT devices makes my communication with other health professionals less reliable.	☐	☐	☐	☐

Please tick only one answer for each question	Strongly Agree	Agree	Disagree	Strongly Disagree
7. Where I work, the software/computer programs/packages, related to ICT devices, are easy to use.	☐	☐	☐	☐
8. The cost of the ICT system would be better used employing more staff	☐	☐	☐	☐
9. The time I spend with patients is reduced because of the time I spend at the ICT devices	☐	☐	☐	☐
10. I think we are in danger of letting ICT devices take over.	☐	☐	☐	☐
11. Where I work, ICT devices help to improve the way care is delivered throughout the organisation.	☐	☐	☐	☐
12. The speed of ICT with which I can access information on the ICT devices helps me give better care to patients.	☐	☐	☐	☐
13. Time spent on ICT devices is out of proportion to its benefits.	☐	☐	☐	☐
14. Use of electronic health records is more of a hindrance than a help to patient care.	☐	☐	☐	☐
15. I feel there are too many ICT devices around now.	☐	☐	☐	☐
16. Where I work, ICT devices make staff less productive	☐	☐	☐	☐

Please tick only one answer for each question	Strongly Agree	Agree	Disagree	Strongly Disagree
17. Using ICT devices is more trouble than it's worth.	☐	☐	☐	☐
18. I am satisfied with the amount of general ICT training I have received.	☐	☐	☐	☐
19. I have all the general ICT skills I need for my job.	☐	☐	☐	☐
20. It isn't worthwhile for healthcare professionals to acquire ICT skills.	☐	☐	☐	☐
21. I can usually get help quickly when I need some advice about using ICT devices.	☐	☐	☐	☐
22. I would like to know more about ICT devices generally.	☐	☐	☐	☐
23. I am satisfied with the level of general ICT training I have received.	☐	☐	☐	☐
24. I can't think of any benefits associated with using ICT devices at work	☐	☐	☐	☐
25. Using ICT devices helps to increase professionals' knowledge base.	☐	☐	☐	☐
26. The ICT training I have received has helped me to be efficient at work.	☐	☐	☐	☐
27. I would like to have on-going training to help me improve my ICT skills.	☐	☐	☐	☐
28. ICT skills are becoming more and more necessary for health care professionals.	☐	☐	☐	☐

Please tick only one answer for each question	Strongly Agree	Agree	Disagree	Strongly Disagree
29. I feel I need more training to use the ICT devices properly	☐	☐	☐	☐
30. In order to be successful in my career I need to be able to work with ICT devices.	☐	☐	☐	☐
31. I can usually get help quickly when I have an ICT device problem	☐	☐	☐	☐
32. I am easily able to learn new ICT skills.	☐	☐	☐	☐
33. The ICT training provided by my organisation is poor.	☐	☐	☐	☐
34. The ICT training I have received has helped me to use the ICT devices efficiently.	☐	☐	☐	☐
35. I lack confidence in my general ICT skills.	☐	☐	☐	☐
36. There are enough printers for everyone to print what they need.	☐	☐	☐	☐
37. The ICT devices where I work often break down.	☐	☐	☐	☐
38. I usually feel informed about changes that take place in my organisation.	☐	☐	☐	☐
39. I generally feel confident working with ICT devices.	☐	☐	☐	☐
40. ICT devices make me feel stupid.	☐	☐	☐	☐

Please tick only one answer for each question	Strongly Agree	Agree	Disagree	Strongly Disagree
41. There are too few ICT device terminals available for the number of staff.	☐	☐	☐	☐
42. I'm often unsure what to do when using ICT devices.	☐	☐	☐	☐
43. When changes happen, my organisation generally copes well on the whole.	☐	☐	☐	☐
44. I only attend ICT training because I have to.	☐	☐	☐	☐
45. At work I feel that my opinions are disregarded by the organisation.	☐	☐	☐	☐
46. I am able to choose when I use the ICT device at work.	☐	☐	☐	☐
47. I sometimes feel very intimidated by the thought of using ICT devices.	☐	☐	☐	☐
48. Where I work, the organisation provides adequate support for staff to use the ICT system efficiently.	☐	☐	☐	☐

Overall Comments

Please put any further comments about your usages of ICT in clinical contexts in the following box.

Part 2

A. Information About You

1. Date of birth _____/_____ (e.g. AUG / 1989)

2. Gender (please tick as appropriate)

   Female ☐ Male ☐

3. Country of origin _____ (e.g. UK)

4. Year of Nursing School (please tick as appropriate)

   1yr ☐ 2yr ☐ 3yr ☐ 4yr ☐

5. Level of Education (please tick as appropriate)

   Studying for bachelor's degree ☐ Bachelor's degree ☐

   Master's degree ☐ Doctor's degree ☐

6. In what settings have your nursing placements taken place?

(Please write in e.g. Community / Accident and Emergency Department / mental health department)

_____

B. About your ICT use

1. How often do you use ICT devices; (please tick as appropriate)

	Never	Once a week	2~3 times a week	4 times a week	Everyday	Every hour
at home?	☐	☐	☐	☐	☐	☐
at university?	☐	☐	☐	☐	☐	☐
in the clinical context during placement?	☐	☐	☐	☐	☐	☐

2. What do you use ICT devices for? (please tick **all** that apply)

	at home?	at University?	in the clinical context?
Making phone calls	☐	☐	☐
Playing games	☐	☐	☐
Word processing	☐	☐	☐
Internet for information gathering	☐	☐	☐
Internet for information sharing	☐	☐	☐
Email	☐	☐	☐
Internet for shopping	☐	☐	☐
Internet for chat or discussion rooms	☐	☐	☐
Internet for SNS	☐	☐	☐
Internet for watching videos for fun (e.g. YouTube)	☐	☐	☐
Internet for watching videos for educational use (e.g. online lecture)	☐	☐	☐
Monitoring patient data, records, ordering, stock control management	☐	☐	☐
Other (please give details)			
_____	☐	☐	☐
_____	☐	☐	☐
_____	☐	☐	☐

3. Do you have any formal training in the use of ICT devices (e.g. Microsoft Office Specialist)? (please tick the appropriate answer)

   Yes ☐ No ☐

   If Yes, please give details_____

4. How would you rate your experience in terms of your usage of ICT devices? (please circle the appropriate answer)

Inexperienced										Experienced
0	1	2	3	4	5	6	7	8	9	10

5. How would you rate your confidence in terms of your usage of ICT devices? (please circle the appropriate answer)

Unconfident										Confident
0	1	2	3	4	5	6	7	8	9	10

6. Which ICT devices have you been using or did you use in the clinical setting during your placement? (please tick as appropriate);

			If **Yes**, how often do you use the devices during placement				
	Yes	No	Once a week	2~3 times a week	4 times a week	5 times a week	Every hour
Mobile devices (e.g. smartphone and iPad)	☐	☐	☐	☐	☐	☐	☐
Desktop	☐	☐	☐	☐	☐	☐	☐
Laptop	☐	☐	☐	☐	☐	☐	☐
Medical technology devices (e.g. electronic blood pressure monitors)	☐	☐	☐	☐	☐	☐	☐
Other devices (please write)	_____		☐	☐	☐	☐	☐

7. Do you think those ICT devices are useful for your nursing knowledge building during placement? (please tick the appropriate answer)

Yes ☐ No ☐

If Yes or No, please give details why you think like that

_____

Can we contact you for further information?

We may want to talk to some nursing students in person for a later stage of this research. If you may be interested in participating in the later stage, please provide your contact details below. These will be kept confidential and used only for the purpose of contacting you as you have indicated. We may not be able to meet everybody during this research depending on the number of responses received. However, if you want to discuss something specific with us, you can find our contact details on the first page of this questionnaire.

Name

Email

Mobile

Thank you very much for taking the time to complete this questionnaire

Appendix 3.2: Korean version of Information Technology Attitude Scales for Health (ITASH)

University of Edinburgh
School of Health in Social Science

정보통신기술에(ICT) 대한 간호학생들의 태도 연구

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이 설문지에 참여하기 위해 시간 내 주셔서 감사합니다.

안녕하세요. 저는 영국 에딘버러 대학교(University of Edinburgh)에서 Charlotte Clarke and Dr. Karen McKenzie 지도하에 간호학 박사과정에 재학중인 학생입니다. 제 연구의 목적은 간호학생들이 임상 실습 환경에서 정보통신기술을 (Information Communication Technology, ICT)을 사용하여 간호지식을 습득하는 과정에 관한 교육이론을 만드는 것입니다.

특히, 제 연구의 한 파트로 ICT에 대한 간호학생들의 태도를 알아보기 위해 서울에 있는 대학교에 다니며, 임상 실습 경험이 있는 간호 학생들을 상대로 본 설문지를 만들었습니다. 바쁘시더라도 부디 이 설문지에 참여해 주실 것을 부탁의 드립니다. 이 설문지에 답하실 때에는 본인이 ICT를 일상생활에 사용한 경험에 근거하여 작성해 주시면 감사하겠습니다. 이 설문지는 크게 두 파트로 나뉘어져 있으며 작성하시는데 약 20분 가량 소요 될 것이라 예상 됩니다.

제공해 주시는 모든 정보는 익명으로 처리 될 것 입니다. 하지만 이 설문지 (양적 연구) 후에 이어질 질적 연구에 참여를 원하시는 분에게는 몇몇 개인정보를 추가로 물어볼 것입니다. 비록 추후 연구를 위해 몇몇 추가 정보를 물어보겠지만, 이 정보 역시 타인에게 제공되거나 열람 되지 않을 것입니다.

참여자에게 이 연구로 하여금 예상되는 혜택과 위험은 없으며, 참여자는 아무 때나 본인이 원할 때 이유의 설명 없이 연구 참여를 멈출 수 있습니다. 그리고 참여자는 본인이 제공한 자료의 파기 및 철회를 요구할 수 있는 권리가 있습니다.

이 연구는 University of Edinburgh의 윤리 위원회의 승인을 받아 진행되고 있습니다.

만약 이 연구에 대한 질문 혹은 의견이 있으시거나 이 설문지의 결과를 알고 싶으신 분께서는 첫 페이지에 나와 있는 본 연구자 혹은 지도교수의 이메일로 연락 주시면 감사하겠습니다.

본 설문지의 응답 방법은 다음과 같이 해당 되는 답변에 체크 해주시거나 밑줄이 그어져 있는 부분에 답변을 달아 주시면 감사하겠습니다

예시 1) 예 ☐ 아니요 √ ☐

2) 자주 사용하는 ICT 기기를 기입해 주세요: 노트북, 스마트 폰

본 연구에 참여해 주셔서 감사 드립니다.

정보통신기술에(ICT) 대한 간호학생들의 태도 연구

* 본 설문지는 이 설문지를 개발한 Ward et al. (2006)의 동의를 받고 수정되었습니다.
* 본 설문지의 목적을 위하여 다음 내용들이 본 설문지에 적용 됩니다;
  - 이 설문지에서 "ICT (정보통신 혹은 IT) 기기"들은 데스크톱 컴퓨터, 노트북, 이동통신장치들 (예:스마트폰, PDA, 태블릿PC, 슬레이트 PC)등 모든 정보통신 기기를 포함합니다.
  - 이 설문지에서 "근무지"라는 용어는 모든 종류의 임상환경을 포함합니다.
  - 이 설문지에서 "근무"라는 용어는 모든 종류의 간호 행위와 실습을 포함합니다.
  - 이 설문지에서 "직원"이라는 용어는 간호학생을 포함합니다.
  - 이 설문지에서 "조직"이라는 용어는 병원과 간호대학을 포함합니다.

파트 1

본인의 느낌과 경험을 가장 잘 반영하는 답에 체크해 주세요.

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
1. ICT(정보통신기술 혹은 IT) 기기들을 사용하는 것은 환자/고객 돌봄(care)을 개선하는데 도움이 된다.	□	□	□	□
2. 내가 ICT 기기들로부터 얻을 수 있는 정보들은 내가 환자들에게 더 나은 돌봄(care)을 제공하는데 도움을 준다.	□	□	□	□
3. ICT 기기들을 사용하는 것은 타 건강관리 전문가(health care professional)들과 나의 의사소통을 더 빠르게 한다.	□	□	□	□
4. 나는 의료서비스에 ICT 기기들을 사용하는 것이 환자들의 비밀을 침해할 까봐 걱정이 된다.	□	□	□	□
5. 나는 ICT 기기들이 우리가 개별화된 돌봄(care)을 제공하는데 도움을 줄 수 있다고 생각한다.	□	□	□	□
6. ICT 기기들을 사용하는 것은 나와 타 건강관리 전문가들과의 의사소통을 덜 신뢰하게 한다.	□	□	□	□

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
7. 내가 근무(실습)하는 곳에서 ICT 기기들과 관련된 소프트웨어/컴퓨터 프로그램/패키지를 사용하기 쉽다.	□	□	□	□
8. ICT 시스템에 드는 비용을 더 많은 직원을 고용하는데 사용하는 것이 낫다.	□	□	□	□
9. 내가 ICT기기들에 시간을 소비하기 때문에 환자와 보내는 시간이 줄어든다.	□	□	□	□
10. 나는 ICT 기기들이 우리(사람)를 대신하게 되는 위험에 처해 있다고 생각한다.	□	□	□	□
11. 내가 근무(실습)하는 곳에서, ICT기기는 돌봄(care)이 그 조직 곳곳에 전달되는 방법을 증진시키는데 도움이 된다.	□	□	□	□
12. 내가 ICT 기기에 있는 정보에 접근할 수 있는 속도는 내가 환자들에게 더 나은 보살핌을 제공하는 데에 도움이 된다.	□	□	□	□
13. ICT기기에 소비되는 시간은 그것의 혜택에 비하여 과중하다.	□	□	□	□
14. 전자의무기록 사용은 환자 돌봄(care)에 도움이 되기보다는 오히려 방해가 된다.	□	□	□	□
15. 나는 지금 곳곳에 너무 많은 ICT기기들이 있다고 생각한다.	□	□	□	□

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
16. 내가 근무(실습)하는 곳에서, ICT 기기들은 직원들을 덜 생산적으로 만든다.	□	□	□	□
17. ICT 기기들을 사용하는 것은 그것이 지닌 가치보다 더 많은 문제가 있다.	□	□	□	□
18. 나는 내가 받은 일반적인 ICT 교육의 양에 만족한다.	□	□	□	□
19. 나는 내 일을 위해 필요한 모든 일반적인 ICT 기술들을 가지고 있다.	□	□	□	□
20. 건강관리 전문가들이 ICT기술들을 습득하는 것은 가치가 없다.	□	□	□	□
21. 내가 ICT기기들을 사용하는데 있어서 약간의 조언이 필요할 때 나는 보통 빠르게 도움을 얻을 수 있다.	□	□	□	□
22. 나는 일반적으로 ICT기기들에 대해 더 많은 것을 알고 싶다.	□	□	□	□
23. 나는 내가 받은 ICT교육 수준에 만족한다.	□	□	□	□
24. 나는 근무(실습)지에서 ICT기기들을 사용하는 것과 관련된 어떠한 혜택도 생각할 수 없다.	□	□	□	□

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
25. ICT기기들을 사용하는 것은 전문가들의 지식 기반을 넓히는데 도움이 된다.	□	□	□	□
26. 내가 받은 ICT교육은 근무(실습)지에서 내가 효율적으로 일하는데 도움이 되었다.	□	□	□	□
27. 나는 나의 ICT기술들을 향상시키는 것을 도와줄 지속적인 교육을 받고 싶다.	□	□	□	□
28. ICT기술들은 건강관리 전문가에게 점점 더 필요해지고 있다.	□	□	□	□
29. 나는 ICT기기들을 적절하게 사용하기 위해 더 많은 교육이 필요하다고 느낀다.	□	□	□	□
30. 나의 성공적인 경력을 위해 나는 ICT기기들을 가지고 일할 수 있어야 한다.	□	□	□	□
31. ICT기기에 문제가 생겼을 때 나는 보통 빠르게 도움을 얻을 수 있다.	□	□	□	□
32. 나는 새로운 ICT 기술들을 쉽게 배울 수 있다.	□	□	□	□
33. 내가 속한 조직에 의해 제공되는 ICT 교육은 불충분하다.	□	□	□	□

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
34. 내가 받아온 ICT 교육은 내가 ICT기기들을 효율적으로 사용하는 것에 도움이 되었다.	□	□	□	□
35. 나는 나의 일반적인 ICT 기술들에 대한 자신감이 부족하다.	□	□	□	□
36. 모든 사람들이 자신이 필요한 것들을 출력할 수 있는 충분한 프린터들이 있다.	□	□	□	□
37. 내가 근무(실습)하는 곳에 있는 ICT 기기들은 종종 고장이 난다.	□	□	□	□
38. 내가 속한 조직 내에 일어나는 변화들에 대하여 나는 보통 잘 전달 받는다고 느낀다.	□	□	□	□
39. 나는 일반적으로 ICT 기기들과 함께 일하는 것에 자신감을 느낀다.	□	□	□	□
40. ICT 기기들은 내가 어리석다고 느끼게 한다.	□	□	□	□
41. 직원 수에 비해 사용 가능한 ICT기기 단말기 수가 너무 적다.	□	□	□	□
42. ICT 기기들을 사용할 때 나는 종종 무엇을 해야 할 지 확신이 서지 않는다.	□	□	□	□

각 질문에 답변은 하나씩만 체크해주세요	매우 그렇다	그렇다	그렇지 않다	매우 그렇지않다
43. 변화가 발생할 때, 내가 속한 조직은 일반적으로 전반에 걸쳐 잘 대처한다.	□	□	□	□
44. 나는 ICT교육에만 참석한다 왜냐하면 그렇게 해야만 하기 때문이다.	□	□	□	□
45. 근무(실습)지에서 나는 내 의견이 조직에 의해 무시되고 있다고 느낀다.	□	□	□	□
46. 나는 근무(실습)지에서 ICT 기기들을 언제 사용할지 선택할 수 있다.	□	□	□	□
47. 나는 때때로 ICT 기기들을 사용해야 한다는 생각에 매우 위축됨을 느낀다.	□	□	□	□
48. 내가 근무(실습)하는 곳에서, 이 조직은 직원들이 ICT 시스템을 효율적으로 사용하도록 충분한 지원을 제공한다.	□	□	□	□

전반적인 코멘트

임상환경에서 본인의 ICT기기 사용에 대한 추가 코멘트가 있으시다면 아래 박스에 적어주세요.

파트 2

A. 설문지 작성자 정보

1. 출생 년도 / 월 _____/_____ (예: 1989년 / 8월)

2. 성별 (해당사항에 체크해 주세요)
   여자 □ 남자 □

3. 출생국가 _____(예: 한국)

4. 간호학과에서 현재 학년(해당사항에 체크해 주세요)
   1학년 □ 2학년 □ 3학년 □ 4학년 □

5. 학력 (해당사항에 체크해 주세요)
   학사과정 중 □ 학사□ 석사 □ 박사 □

6. 지금까지 어느 파트에서 간호 실습을 하셨습니까? (예: 지역사회간호 실습지 / 응급실 / 정신과 병동 / 내과 병동 / 신경과 병동 등)
   _____

B. 본인의 ICT 사용에 대한 설문

1. 당신은 아래 환경들 (집/대학교/임상환경)에서 얼마나 자주 ICT기기를 사용하나요? (해당사항에 체크해 주세요)

	전혀 사용하지않는다	일주일에 한번	일주일에 2~3번	일주일에 4번	매일	매 시간
집	□	□	□	□	□	□
대학교	□	□	□	□	□	□
임상 (실습 중)	□	□	□	□	□	□

2. 당신은 아래 환경들 (집/대학교/임상환경)에서 ICT기기들을 무엇을 위해 사용하나요? (해당사항에 모두 체크해 주세요)

	집	대학교	임상환경
전화	☐	☐	☐
게임	☐	☐	☐
문서 작업	☐	☐	☐
정보 획득을 위한 인터넷 사용	☐	☐	☐
정보 공유를 위한 인터넷 사용	☐	☐	☐
이메일	☐	☐	☐
쇼핑을 위한 인터넷 사용	☐	☐	☐
채팅 혹은 토론을 위한 인터넷 사용	☐	☐	☐
소셜네트워크(SNS)를 위한 인터넷 사용	☐	☐	☐
(재미) 비디오 시청을 위한 인터넷 사용 (예: 유튜브)	☐	☐	☐
(교육) 비디오 시청을 위한 인터넷 사용 (예: 동영상강의)	☐	☐	☐
환자정보, 기록, 처방, 체고관리 모니터링	☐	☐	☐
기타 (ICT를 사용하는 목적을 적어주세요)			
_____	☐	☐	☐
_____	☐	☐	☐
_____	☐	☐	☐

3. 당신은 ICT 기기를 사용에 관한 정규 교육을 받은 적이 있습니까 혹은 자격증이 있습니까? (예: 마이크로소프트 오피스 전문가 (MOS) 과정)

예□ 아니요□

만약 "예"라고 체크 하셨다면 그것에 대한 자세한 정보를 기입해 주세요

_____

4. ICT 기기들의 사용에 대한 당신의 경험을 어떻게 평가 하시겠습니까?
(해당 답변에 동그라미를 해주세요)

경험이 부족한										경험이 풍부한
0	1	2	3	4	5	6	7	8	9	10

5. ICT 기기들의 사용에 대한 당신의 자신감을 어떻게 평가 하시겠습니까?
(해당 답변에 동그라미를 해주세요)

자신감 없는										자신감 있는
0	1	2	3	4	5	6	7	8	9	10

6. 당신은 <u>임상 실습 도중</u> 어떠한 ICT 기기를 사용해 왔거나 사용했습니까?
(해당 답변에 체크해 주세요).

			만약 <u>예</u> 라면 얼마나 자주 그 기기들을 실습기간중 사용하시나요?				
	예	아니요	일주일에 1회	일주일에 2-3회	일주일에 4회	일주일에 5회	매 시간마다
모바일 기기 (예: 스마트폰, iPad)	□	□	□	□	□	□	□
데스크탑 컴퓨터	□	□	□	□	□	□	□
노트북	□	□	□	□	□	□	□
의료테크놀로지 기기들(예:전자혈압계)	□	□	□	□	□	□	□
다른 기기들 (적어주세요)	_____		□	□	□	□	□

7. 당신은 위 질문에서 언급된 ICT기기들이 임상실습 중 간호지식구축에 유용하다고 생각합니까?

예□ 아니요□

만약 <u>예</u> 혹은 <u>아니요</u> 라고 응답하셨다면, 왜 그렇게 생각하셨는지 이유를 적어주세요.

_____

추후 연구에 참여를 위해 연락처를 남겨 주실 수 있으십니까?

저희는 본 연구의 마지막 단계에서 몇몇 간호 학생 분들과 개별 면담을 계획하고 있습니다. 만약 본 연구의 참여에 관심이 있으시다면, 본인의 연락처를 포함한 몇몇 정보를 남겨주세요.

제공하신 정보는 비밀로 유지될 것이면 오직 본 연구를 위해 본인과 연락하기 위한 목적으로만 사용될 것입니다. 하지만 얼마나 많은 분들이 이 마지막 단계에 참여를 요청했는지에 따라 참여를 요청하신 모든 분들을 만나보지 못할 수 있습니다. 하지만, 본 연구에 대해서 특별히 상의하실 사항이 있으시다면, 본 설문지 첫 페이지에 기재되어 있는 연락처로 연락하시면 됩니다.

이름

이메일

전화번호

설문지 작성을 위해 귀중한 시간 내 주셔서 진심으로 감사 드립니다.

Appendix 4: Initial interview questions for nursing students

Topic 1: Nursing Education

Initial Questions

A. What made you study nursing?

B. Describe the nursing education you have received.

C. Could you tell me about your general learning method in nursing studies?

Intermediate Questions: Clinical placements

1. Could you tell me about the clinical contexts where you have done placements?
   - What do you think a clinical environment is?
   - Tell me about what happened during your placements in hospitals
   - How do you feel when you go to clinical contexts for your placements, compared to studying in classrooms?
   - Could you describe your roles during the placements?
2. Tell me your experience of how you build nursing knowledge via your experience of clinical placements.
   - Are you satisfied?
   - Can you tell me the differences between knowledge building during classroom learning and during clinical placements?
   - How do you utilise nursing knowledge, which acquired from classroom learning, for the placements?
   - Could you describe your positive (successful) and negative (failed) experiences to construct nursing knowledge during the placements?
   - Please tell me about your experience of using tools during placements for your learning?
   - Who are the most influential persons for you during your clinical placements / Why do you think so?

- What kinds of clinical contexts would be useful for effective placements? / Why do you think so?

3. Could you explain your process of learning during clinical placements?

Topic 2: Experience of ICT

Initial Questions

1. Tell me briefly about your general experiences using ICT
   - What is the main purpose of using ICT?
2. Could you tell me what you think are the advantages/disadvantages of ICT?
3. Tell me about your competency and confidence in using ICT?
4. Tell me about your experience of using your ICT for nursing knowledge building?
   - How do you use it?
   - What made you use ICT for knowledge building?

Intermediate Questions: Use of ICT for Clinical placements

1. Could you describe nursing professionals' use of ICT in clinical contexts?
   A. How does ICT influence their nursing care?
   B. What are the advantages/disadvantages of using ICT in clinical contexts?
2. Could you describe a typical situation of your use of ICT during clinical placements?
   - Which kind of ICT do nursing students use the most in clinical contexts?
   - Could you tell me your experience with it?
   - How do you feel when you use ICT during clinical placements? Why?
3. How does your general ICT competency influence your use of ICT in clinical contexts?
4. Tell me about the persons who have the most influence on your ICT use in clinical contexts?

Ending Questions

1. Tell me about positive aspects of nursing education you have received so far?
2. What are the most important factors that influence your nursing education, especially clinical placements?
3. Is there anything else you think I should know to understand the above topics better?
4. Is there anything you would like to ask me?

Appendix 5.1: Second interview questions for nursing students

◆ **Processing information for knowledge building**

1. Definition of information and knowledge

- Tell me about your experiences of obtaining information and knowledge.
- What is your definition of information and knowledge?
- What is the relationship between them?
- How do you handle information for knowledge building?
- Do you share your knowledge or information, or co-work with others to build nursing knowledge?

2. Information sources

- Tell me about the reliable information sources for your learning in nursing studies.
- How do you utilise ICT for your learning in nursing studies?
  - What is the role of ICT in obtaining information and knowledge?
- What are your reasons for preferring textbooks over ICT?
  - Why do you trust textbooks more than ICT?

◆ **Additional questions for clinical placement learning**

1. Purpose of clinical placements
   - Tell me about the purpose of clinical placements for nursing students
     - What do nursing students obtain from clinical placement?
2. Observation
   - Tell me about your experience of observation during clinical placements
     - How do you utilise the observation experience for knowledge building

3. Socio-cultural influences on clinical placements
    - Tell me about nunchi
        - What is your definition of nunchi?
        - Why do you use the nunchi mechanism during your placement?
        - Tell me about nunchi in other learning environments (i.e., classroom and simulation)
    - Tell me about your (social) position during clinical placements.
    - Tell me about your emotional burdens during clinical placements?
        - Physical burdens?
4. Case report
    - Tell me about the case report that you need to do during clinical placements
        - Tell me about your process of case report
5. Other questions
    - How do you apply your pre-acquired knowledge from classroom or simulation-based learning?
    - How does your attitudes (i.e., active or passive) influence your learning in clinical contexts?

◆ **Relationship between clinical placement classroom, and simulation-based learning**

- Tell me about the relationship between classroom learning, clinical placements and simulation-based learning, based on your "experience"
- How does experience influence learning?
    - What are the differences of indirect and direct experiences?
- How do you utilise pre-acquired knowledge from other learning environments in nursing studies?

- Tell me about memorisation

1. Simulation-based Learning

- Tell me about simulation-based learning
  - What is your learning process in this learning?
  - Compare the experiences of observations during clinical placements and real practice during simulation-based learning
  - Tell me about self-regulated learning / knowledge sharing / co-construct meaning with others / reflection
- How do you think what the purpose of simulation-based learning is?
- What have you learnt and felt from simulation-based learning?
- Tell me about the advantage and disadvantages of simulation-based learning?

2. Classroom learning

- Tell me about your classroom learning and your process of learning

◆ **Use of EMR**

- Tell me about your use of EMR during placements
  - Tell me about the purpose of using EMR
  - How do you handle medical (or nursing) information
- How do you feel if you can't use your ICT devices during clinical placements?
- Why do your ICT skills and confidence decrease when you visit the clinical context during placement?

Appendix 5.2: Interview questions for nurses

Topic 1: Clinical Environments

1. Could you tell me about the clinical environments and the atmosphere of where you have worked?
    - How do you feel about working in those environments?
    - Tell me about differences of clinical contexts between now and 5/10 years ago
    - What kinds of clinical environments would be good for the effective patient care?
    - What kinds of clinical environments would be useful for nursing students to have effective placements?
2. Could you describe your work and its processes?

Topic 2: Training nursing students

1. What is happening in clinical environments when nursing students visit your hospital for their placements?
2. What do you think the purpose of clinical placements is?
    - What are advantages and disadvantages of current clinical placements?
    - Do you think clinical placements are currently proceeding properly for effective nursing education? Why do you think so?
    - What kinds of educational methods are good for the nursing students to have effective placements?
3. Tell me about your experiences of education nursing students
    - How have you trained the students?
    - How do you feel when nursing students visit the hospital for their placement?
    - Have you had any experience of giving up educating the nursing students

due to your work? Why?

- What do you think about the students' (social) position during their placement?
- Tell me about nunchi and students' use of the nunchi
- What kinds of duties do you give nursing students during their placements?

4. Tell me about your opinion of the use of ICT (EMR) by nursing students?

Topic 3: Experience of ICT

1. Tell me about clinical ICT in your working place
    - What are the merits and demerits of using ICT in clinical contexts?
    - What is the purpose of using ICT in clinical contexts?
    - Which kind of ICT is the most used in clinical contexts?
2. Tell me briefly about your experiences of using ICT in clinical context?
    - How does ICT influence your practice?

Appendix 5.3: Interview questions for university lecturers

Topic 1: Nursing Education

1. Tell me about general nursing education in the current era
    - Could you compare this education with that of the past? What are the differences?
    - What do you think are the good and bad aspects of the education in the current era?

Topic 2: Clinical placements

1. Could you explain the current clinical placement curriculum?
    - How does it run?
2. What do you think is the purpose of clinical placements?
    - What do you think are the advantages and disadvantages of current clinical placements?
    - Do you think clinical placements are currently proceeding properly for effective nursing education? Why do you think so?
3. Please evaluate current ICT environments in clinical contexts

Topic 3: Simulation-based learning

1. Tell me about simulation-based learning
2. What is the purpose of simulation-based learning?
    - What are the advantages and disadvantages of this learning?
    - What are the instructors' / students' roles in this learning?

Topic 4: Classroom learning

1. Tell me about classroom learning?

2. What is the purpose of classroom learning?
    - What are the advantages and disadvantages of this learning?
    - What are instructors' / students' roles in this learning?

Topic 5: ICT

1. What is the role of ICT during nursing education (clinical contexts, simulation-based learning and classroom learning)?
2. Could you tell me about the ICT education that is provided by the university?
    - Does your university teach nursing students how to use clinical ICT?
    - Do you think current education methods are appropriate for all three environments?

Appendix 6: Third interview questions for nursing students

◆ **Relationship between classroom, clinical placement and simulation-based learning**

- Tell me about the relationship between classroom learning, clinical placements and simulation-based learning, based on your "experience"
- How does experience influence learning?
- How does nursing students' active and passive attitudes influence their learning?
- What are the differences between indirect and direct experiences in nursing education?
- How do you utilise pre-acquired knowledge from other learning environments in nursing studies?
- Tell me about memorisation

◆ **Knowledge building**

1. **Motivation for knowledge building**

- Tell me about your experience of building knowledge using information that you have obtained.
  - How and when do you decide to build knowledge?
  - What kinds of factors influence your decisions?

2. **Level of knowledge**

- Do you believe knowledge is divided into different levels? Why do you think so?
  - What are the differences and the relationships between the levels?
  - Which levels of knowledge do you have from your nursing education? Why do you think so?

◆ **The strongest factors on their learning in clinical environments**

1. Socio-cultural issues: Nunchi & Social hierarchy

- Tell me about nunchi during your nursing education
  - What is your definition of nunchi?
  - How do you use the nunchi mechanism?
  - Why do you use the mechanism, especially during clinical placements?
- Tell me about your social position in the clinical contexts during placements
  - What is the relationship between your social position and the nunchi mechanism?
  - Could you explain the social hierarchy in Korean culture?
  - What do you think about the influence of the hierarchy on your learning in clinical contexts?

2. Emotional burdens

- Tell me about your emotional burdens during clinical placements
  - Why?
  - What do you think about the influence of emotional burdens on your learning in clinical contexts?

◆ **Relationship between learning during clinical placements & using ICT**

- Tell me more about your use of ICT by connecting it with the learning within clinical contexts, as you have explained earlier
  - How do you process information, obtained from the EMR, for your nursing knowledge building?
  - How do you feel when you are restricted from using ICT (EMR) during clinical placements?
  - How do you deal with this restricted situation for your learning?

Appendix 7: An example of 'Memoing'

- **Discovery Nunchi** (during 2nd interviews)

After the first round of interviews and during the second round of interviews, I realised that most of the nursing students naturally and frequently used a Korean word, 'nunchi', when they talked about educational contexts in clinical environments. They had also used the word during the first round of interviews, but I didn't recognise or pay attention to the word. Throughout the second round of interviews, during which the nursing students' spoke about their learning, and while reviewing the first round of interviews, I have now found that nunchi is one of the important aspects of their learning in clinical contexts.

1) What is nunchi, then?

   When I recall my own experience of clinical placements, I most definitely studied nunchi during clinical placements. The reasons I studied nunchi were 1) I didn't want to make nurses uncomfortable because of my presence, 2) I didn't want to interrupt the nurses' workflow and 3) I wanted to appear as a smart student. However, I didn't study nunchi only in clinical environments. Rather, I continuously studied nunchi in other contexts as well. I studied nunchi when I meet persons older than myself, my superiors at the workplace, and so on. Namely, when I think I am in a lower social position than those persons, I tend to study nunchi. Thus, I assume that nunchi is one's individual mechanism to respond to his/her social position.

2) Why should nursing students study nunchi?

Bora told me that nursing students' learning during clinical placements was influenced by the people whose nunchi they should study. Dahee also told me "Obviously I should study nunchi for my learning in clinical environments. It is very natural". Thus, it can be deduced that nunchi is located at the centre of the clinical placement education. Namely, they would study nunchi to be able to receive a comprehensive clinical education in real clinical environments.

During the next round of interviews, I need to further explore the nursing students' thoughts about nunchi; how they perceive nunchi and when they use it (especially during clinical placements). Moreover, I will also need to explore how their social position influences their learning in clinical placements, and how their social position is related to their nunchi mechanism.

- **Memo writing: Focused codes of 'Socio-cultural factor: Social hierarchy' and ' Responding: using nunchi mechanism'** (during 2nd interviews analysis)

The two focused codes of 'social hierarchy' and 'using nunchi mechanism' emerged during the second round interview analysis as it was evident in all interviews.

From the initial codes, it is known that the nursing students regard social hierarchy as a part of Korean culture and that that social hierarchy influences the students' learning. They believed that they are in the lowest position of the hierarchy during clinical placements and this position has caused them to respond by studying nunchi. Therefore, I need to categorise the initial codes that relates to their social position into a focused

code of ‘socio-cultural factors: social hierarchy’, a factor that influences their learning in clinical environments. Moreover, the initial codes related to studying nunchi need to also be categorised into a focused code of ‘using nunchi mechanism’ as a response from the students to the factors influencing their learning during clinical placement.

Meanwhile, nursing students didn’t feel that they were in the lowest positon in classroom environments and they didn’t study nunchi in the classroom as much as in the clinical environments. Nunchi and social position are phenomena that are caused by human relationships. It is obvious that lecturers in their university are in higher social positions than the students, but the students were not as concerned about social hierarchy and nunchi with the lecturers as they were with nurses in clinical environments. Rather, the students felt a strong sense of rapport with the lecturers. This is of no wonder as clinical placements of one or two weeks are too short for the nursing students to establish rapport with nurses. Garam also said, she could learn more and reduce the negative impact of studying nunchi after building rapport with nurses. Thus, I should explore more about the relationship between nunchi from social hierarchy and rapport, while reviewing the properties of the two focused codes.

Appendix 8.1: An example of initial coding

Group 1 Interview (Second interview)

Member of nursing students: Ari, Eunju, Garam and Hyemin

Date: 30th May 2013

Place: C University

Researcher: How can information and knowledge be defined?

Garam: If I were to define information, it would be visual or auditory stimulations, which has not yet undergone any processing, right at the moment I encounter it. Information that has been interpreted and acquired through my internal processes would be my definition of knowledge (*Defining information and knowledge*). It seems to me that I gain information through information technology mediums, and then I acquire knowledge through the process of either writing in my placement journal, or thinking about it, or answering the questions that nurses asked me (*Contacting with information using ICT*).

Researcher: How do you (and/or other participants) build the knowledge?

Eunju: *Information is non-subjective and knowledge is subjective* (*Defining information and knowledge*). *I think when I make an effort to understand or experience the [non-subjective] information, the information will become [my subjective] knowledge.* (*Deciding to obtain information by Volition*).

Hyemin: As Eunju has said about experience, if I obtain information, understand it and then experience it, I can call it knowledge. That's what I think, is that right, Eunju? (*Dividing knowledge stages by Understanding*). (*Reinforcing knowledge by live experience*). Also, you talked about knowledge building… *I don't think I can build*

knowledge from all the information I encounter in everyday life. When I continuously utilise certain information, that information would turn into knowledge… (*Deciding to obtain information by Utilisation*). *For instance, I [obtained information] about nursing in neurology. If I know I will utilise this information for my presentations or in my practice later with real patients, it will eventually become knowledge, as the information will be continuously utilised. However, if I don't utilise the information, it would not become knowledge* (*Deciding to obtain information by Utilisation*).

Researcher: Could you please tell me your process of knowledge building?

Garam: We learn about the nervous system in adult nursing in our third and fourth year. So, our learning about it is based on what we've learned during biochemistry and biology about neurotransmitters, the organisation of the brain, and the anatomy of the cranium. Therefore, I think the process of gradually accumulating information is knowledge. (*Recognising an important role of pre-existing knowledge*), (*Dividing knowledge stages by Synthesising and applying prior knowledge*).

Eunju: My view is a bit similar to Hyemin's. I think we have to make the effort to change information to knowledge. For example, we need to have a specific goal to acquire knowledge (*Deciding to obtain information by Volition*).

Hyemin: Information needs to go through several stages that are not part of our consciousness, such as storage and utilization, to become knowledge (*Dividing knowledge stages*). By storage [in the mind], information can pass several stages but it becomes knowledge only by passing the last stage. Information can pass through and come up to a certain stage, or never go anywhere at all (*Deciding to obtain information by Utilisation*).

Researcher: Well… Can knowledge also turn into information?

Ari: [Yes,] when I send my knowledge to others (*Defining information and knowledge*). If he or she uses it, the information becomes, once again, his or her knowledge

(*Deciding to obtain information by Utilisation*).

Hyemin: Ah yes. I agree with Ari. When I send [my knowledge] to another, it can become information (*Defining information and knowledge*).

Garam: Because it is ambiguous to say that knowledge becomes information within my own mind. Okay, if I were to explain my thoughts… I make notes of the information. Doing this is to organise my knowledge. Through this process, I think information can become knowledge (*Defining information and knowledge*). I don't think knowledge can be reversed to become information within my mind, but when the knowledge is externalised through writing or telling others, it can change [to become information] (*Defining information and knowledge*). Just as Hyemin said before, I need to utilise for it to be called knowledge, because it provides actualisation (*Deciding to obtain information by Utilisation*).

Ari: For example, I come in a cafe and look at the menu. I think this process of looking itself is neither information nor knowledge. At that point, it is nothing. However, if I go home and look up how to make [something from the menu], that is information (*Contacting with information*) (*Deciding to obtain information*). When I continuously utilise that information, it gets stuck in my head and then I can explain this information to others. Then I think that becomes knowledge (*Deciding to obtain information by Utilisation*).

Researcher: What is your meaning of utilisation?

Garam: When I explain [the information] to others or study on the basis of the information. Anyway, when [the information] is continuously used (*Deciding to obtain information by Utilisation*).

Hyemin: I agree with Garam. Knowledge is not just in nursing studies, but general knowledge is also knowledge. When you were talking about knowledge earlier, I told you that information would become knowledge when I utilise it. If I can't utilise the information, I am not sure whether it can be called knowledge or not (*Deciding to*

obtain information by Utilisation). This idea of mine can be reflected on the experience [you asked about]. *For example, I watch the nurses checking patients' vital signs on clinical placements. That is my indirect experience. However, I cannot actually check the patients' vital signs myself. I just observed the practice. So I will need to personally do it and keep practicing to build my knowledge. In some ways I think the indirect experience is just one of the processes of obtaining of information* (*Contacting with information from Experience*), (*Distinguishing between Direct experience and Indirect experience*).

Researcher: What are the differences between indirect and direct experiences?

Hyemin: Yes, it is different. I also read a book and this book points out that the indirect and direct experiences are clearly different. I believe that the scope of indirect experience is wider than direct experience. The indirect experience is to only see a flower, but direct experience is to see the flower as well as to experience its smell and its touch. I would never know its smell and touch when I only see the flower (*Distinguishing between Direct experience and Indirect experience*). I can have direct experience when I attempt to get closer (*Distinguishing between Direct experience and Indirect experience*).

Researcher: Could you explain about simulation-based learning and what is the process?

Ari: First of all, I receive an email from a lecturer the day before or one week before starting simulation. The lecturer gives us a scenario that we will conduct on the day by the email. Then, we study the scenario in advance using books or the internet. On the day of simulation, the lecturer gives us an orientation about the simulation, for example, the available equipment and its locations in the simulation room, how to check pulses and blood pressure of the simulator doll and so on (*1. Understanding scenario during simulation*). Then, we are arranged into teams of three or four students. Each team gathers together and anticipates how the scenario will unfold, and then assign each

member of the team to a role. For example, a member would say, “I will check the simulator’s vital signs”, and then another would say “I will educate”, and so on (*2. Sharing information and knowledge during simulation*). When I enter the room, the instructor presents the situation on the patient’s monitor. Then, we just conduct our nursing plan and our simulation ends (*3. Practicing during simulation*). Then, we watch our recorded performance in the debriefing room and the lecturer gives us feedback (*4. Reflecting during simulation*).

Researcher: Any other comments?

Hyemin: While we are doing our practice, our performances are video recorded. The recording is continued up until the time for feedback. After the practice, we watch the video during the debriefing session. (*4. Reflecting during simulation*).

Researcher: What do you think the reason for simulation-based learning?

Eunju: *I think there are many restrictions to the nursing practice we can do in hospitals. We are not nurses yet, so there is a limit to what we can do, especially performing invasive nursing procedures.* (*Accepting their position*), (*Restricting nursing practice during clinical placements*). *However, we are given chances to practice what we have learnt through simulation. In the hospitals, we can’t actively design the nursing plan but we [passively] accept the plan the nurses designed. You know we have to stand back. But, we can design the procedural plan and practice the nursing procedures through simulation* (*Purpose of simulation based learning*), (*Having chances to conduct practice during simulation*). I think the purpose is let us practice the nursing practice that we are unable to do in hospitals (*Purpose of simulation based learning*).

Researcher: Could you please tell me what you learn and feel during simulation, based on your experience?

Eunju: Firstly, I was able to have time to study about the disease [in the simulation scenario] (*1. Understanding scenario during simulation*). So I can learn about it. Moreover, we can study in advance what nursing practice should be conducted for the disease. That is also what I learnt. As for my feelings, I feel that my skills are lacking as I am unable to do everything I had prepared for the simulation. *Through this simulation-based learning, I feel that my abilities are lacking* (*Undertaking self-directed learning during simulation*), (*Having chances to do practice during simulation in a similar setting to clinical environments*), (*4. Reflecting during simulation).*

Ari: I, too, feel the same way as Eunju. Also, *through the simulation, I can get chances to do nursing practice such as fundamental nursing practice and medications* (*Having chances to do practice during simulation). In addition, I have not been able educate patients as a nursing student [during clinical placements] but [through simulation] I can learn how to explain things to patients* (*Having chances to do practice during simulation*). Moreover, I learn about the importance of teamwork. If we have poor teamwork, our performance is ruined. If just one member of the team is not prepared to put in effort to conduct the performance together, we will get a bad result. That is why I feel the teamwork is important (*Co-constructing knowledge with peers during simulation*).

Researcher: What is the relationship between clinical placements and simulation-based learning?

Garam: As Hyemin said before, it can be explained that the clinical placements are indirect experience and the simulation-based learning is direct experience (*Distinguishing between Direct experience and Indirect experience*). During clinical placements, because we are not nurses we are unable to direct conduct nursing practice ourselves. Rather, we only observe nursing practice and do ancillary tasks that do not require any specific nurse's authority (*Restricting nursing practice during clinical placements*), (*Accepting their position*). However, we can assess patients and conduct interventions during the simulation. *During simulation-based learning, I can perform*

the duties of registered nurses, which I can't do during clinical placements. If there is no simulation-based learning, I would only be able to learn those skills after becoming a nurse with insufficient experience (*Having chances to do practice during simulation*).

Appendix 8.2: An example of the development of categories from initial codes to conceptual category

Interview Quotation	Initial Code	Focused Code	Conceptual Category
However, I understand I can't amend this situation as a student. (Dahee)	Feeling powerless	Conforming the condition in clinical environment	Responding to the six influential factors
I don't feel bad, but there is nothing I can do. (Eunju)			
Because they are busy… they can't explain much to us. (Hwashin)	Understanding busy nurses		
I know that even if the nurses focus only on their duties, they will still end up working overtime. To further explain things to us and educate us, they would end work even later. Also, for the tasks they can complete in one minute, I would require five. If you look at it that way, our clinical placements cause inconveniences to the nurses, with no reward. So, nurses would probably dislike having students around. (Miran)			
I think there are many restrictions to the nursing practice we can do in hospitals. (Eunju)	Accepting clinical conditions		
The clinical contexts are not different from that I expected. (Sarang)			
Especially, in the case of corporate hospitals, they put so much emphasis on patient safety that nursing students can do nothing… We are strictly not allowed to even touch patients. (Ari)			

I think the definition of nunchi is not to act only according to my views, but to be constantly conscious about others' tacit or obvious [behaviours]. To be conscious of and act accordingly to feedback, or direct and indirect stimulation received from others (Hyemin)	Defining nunchi	Using nunchi mechanism
I think [nunchi is caused by] the relationship of gab and eul… It depends on how I personally perceive my social position? I can be the 'gab' when I compare myself with the junior students in my school. I don't study their nunchi… But, if I am the 'eul' to someone, I should do as they wish. (Hyemin)	relating to social hierarchy	
While in the hospital, I have to study the nurses' nunchi. I have to keep following the nurses. The nurses hope that I would find something to do on my own, but there is nothing I can do and just standing there, I can feel the nurses' nunchi. (Bora)	Studying nunchi	
It is not something I had learnt about, [so] I didn't really know that I should study nunchi [during clinical placements], but I realised that I need to study nunchi after experiencing the clinical environments. (Ari)	Socialising	
I think nunchi greatly influences my confidence. When I actively study nurses' nunchi, I know what I should do. So, I perform confidently. Moreover, when I am confident, it helps in my education and I can take control of my learning. If I passively study nurses' nunchi, I worry about whether I should do the task or not, which reduces my confidence (Yoonjin)	influencing on confidence	

Because the nurses don't teach us [enough] I have to actively seek opportunities to learn by myself. A charge nurse in a hospital told me, "The nurses are busy, so you should observe and learn by yourself"... I am scared of the nurses and of asking questions in the ward, so I realised I have no choice but to self-study, which makes my confidence drop. (Yoonjin)	Being active for learning	
My university lecturers advised us that although we are not given many chances to do nursing practice, we should actively find other things that we can do such as talking to patients more and changing patients' positions. Although it might not be enough experience [as we wish], you can still do some things. It depends on individual abilities. (Garam)	Designing own learning plan	Undertaking self-directed learning
While studying on my own, I found that a patient was X-rayed. I was curious as to why the patient was x-rayed [but I couldn't find out why]. Just based on that information, I don't know why this patient had an X-ray taken, and what the results indicate [with only my own knowledge]. (Sarang)	Being difficult to study alone	

Appendix 9: Ethical approval from the University of Edinburgh

12th October 2012

SCHOOL of HEALTH IN SOCIAL SCIENCE

The University of Edinburgh
Medical School
Doorway 6, Teviot Place
Edinburgh EH8 9AG

Phone 0131 651 3969
Fax 0131 650 3891

Email: health@ed.ac.uk

'To Whom it May Concern'

Mr Jung Jae Lee
Student number: s1003070
Current Home address:
62, 2F2 Thistle Street
Edinburgh
EH2 1EN

The above named is currently a student with the University of Edinburgh. Mr Lee is a full time postgraduate research student on the Nursing Studies (PhD) programme at the School of Health in Social Science, College of Humanities and Social Science. He started the programme on 1st September 2011 and his estimated maximum end date is 31st August 2015.

Mr Lee is supervised by Professor Charlotte Clarke and Dr Karen McKenzie.

I confirm that the research proposal has been approved by the School of Health in Social Science Ethics Committee.

Please do not hesitate to contact me if you need any further information.

Yours sincerely

Professor Kath Melia
Subject Area Research Ethics Co-ordinator

Appendix 10.1: Informed consent form for nursing students (English version)

- **Title of the research:**

  A research study of nursing student's knowledge building process using ICT in clinical environments

- **The purpose of this research and process:**

  This research is designed to explore nursing students' use of Information Communication Technology (ICT) in clinical environments and how they construct knowledge with ICT, so as to enhance the understanding of both the students' experience in using the ICT and their knowledge building process. From this research, this research ultimately expects to develop and supply an effective instructional strategy for nursing education.

  You are being invited to take part in this research because we feel that your experience as a nursing student can contribute much to our understanding of nursing students' knowledge building using ICT during clinical placements.

  The researcher will ask about your process, experience, feelings, emotions and so on regarding how you build nursing knowledge using ICT during clinical placements. This interview would take about one to one and a half hours. A voice recorder will be used to record your interview. The location at which this interview takes place will be determined by considerations of your convenience, comfortability and availability.

- **Confidentiality:**

  The information that we collect from this research project will be kept private. Your name and information will be dealt with anonymously. No one else except this researcher and his supervisors will have direct access your information or the information you provide. All collected information will be discarded after completing this research.

- **Benefits, risks and inconvenience as a participant:**

  There will be no direct benefit or incentive to you, but your participation is likely to help us understand nursing student's knowledge building using ICT and contribute to develop a theory related to the knowledge building. Moreover, there will be no direct risks to you, with the exception that you may share some personal or confidential information by chance, or that you may feel uncomfortable talking about some of the topics. However, we do not wish or intend for this to happen.

- **Right to Refuse or Withdraw:**

  You do not have to answer any question or take part in the interview if you feel the questions are too personal or if talking about them makes you uncomfortable. Moreover, you have right to withdraw your participation in this research anytime without any penalty.

- **Voluntary Participation:**

  You understand the purpose, indirect benefits, and potential risks of this research, and are informed of your rights in this research. You voluntarily participate in this research and allow your interview to be recorded and documented.

Date:

Name:

Signature:

Main researcher: Jung Jae LEE (+44 74xxxxxxxx, xxxxxx@gmail.com)

Supervisors: Prof. Charlotte Clarke, Ms. Maggie Carson

Appendix 10.2: Informed consent form for nursing students (Korean version)

- **연구 주제:**

  임상실습환경에서 ICT 를 이용한 간호학 학생들의 간호지식 구축 과정 연구

- **연구의 목적 및 절차**

본 연구는 간호대학교 학생들이 임상실습 환경에서 ICT를 사용하여 어떻게 간호 지식을 구축하는 과정을 연구하여 그들의 임상환경에서 ICT를 이용한 지식구축 경험을 이해 및 파악하고, 궁극적으로는 이 경험을 바탕으로 임상환경에서 더욱 효율적인 간호 교육 방법을 개발, 제공하여 그들이 적절한 간호지식을 습득하는 것을 증진시키는데 있습니다.

간호학생으로서의 당신의 경험은 이 연구주제에 대한 이해에 많은 기여를 할 수 있다고 판단되어 우리는 이 연구에 당신을 초대하고 싶습니다.

연구자는 참여자가 지금까지 임상 실습을 하는 동안 ICT를 이용하여 간호 지식을 어떻게 구축하였는지에 대한 과정, 경험, 느낌 그리고 감정 등에 대하여 질문을 할 것이며, 각 면담에 소요되는 시간은 약 1시간~1시간 30분 정도 일 것입니다. 면담 내용은 녹음 될 것이며, 면담 장소는 참여자의 편의를 고려하여 정해질 것입니다.

- **비밀유지**

이 연구에서 수집한 정보는 모두 비밀로 유지될 것 입니다. 참여자의 이름 및 정보는 익명으로 처리 될 것이며, 이 연구자 및 이 연구자의 지도교수 외에는 참여자에게 얻은 정보에 직접적으로 접근 할 수 없습니다. 연구가 끝나면 이 정보는 폐기될 것입니다.

- **연구 참여로 인한 이득, 위험 및 불편**

본 연구는 참여자에게 직접적인 이득이나 보상은 없습니다. 하지만, 이 연구의 결과는 간호 학생들이 ICT를 이용하여 지식을 구축하는 것에 대한 이해를 도울 것이며, 이를 토대로 실체이론을 개발하는데 기여할 것입니다. 또한 본 연구에

참여함으로써 발생하는 직접적 위험은 없습니다. 하지만 잠재적인 위험으로 우연히 참여자는 개인적인 혹은 비밀 정보를 공유 할 수 있으며 어떠한 연구 주제 및 질문에 대하여 불편 감을 느낄 수 있습니다. 하지만 우리는 이러한 위험이 참여자에게 일어나길 바라지 않습니다.

- **연구 참여 거절 및 참여 철회의 권리**

그래서 참여자 분이 느끼기에 연구 질문이 너무 개인적이거나 참여에 있어 불편함을 가지신다면 참여자 분은 이 질문에 대답하지 않아도 되며, 혹은 연구의 참여를 거절할 수 있습니다.

- **연구 참여 의사**

당신은 이 연구의 목적, 간접적인 이득 그리고 잠재적 위험을 이해하고 있으며 이 연구의 참여자로서의 권리에 대해 설명 받았습니다. 당신은 자발적으로 이 연구에 참여 하며, 당신의 인터뷰가 녹음되고 문서화 되는 것을 허락합니다.

20__ 년 __월 __일

참여자 성 명:_____

서 명:_____

주 연구자: 이정재 (+4474xxxxxxxx, xxxxxx@gmail.com)

지도교수: Prof. Charlotte Clarke, Ms. Maggie Carson